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TRC

TECHNICAL MEMORANDA
NOS. 6 THROUGH 12
VOLUME 5

Prepared for

United States Environmental Protection Agency

San Francisco, California

Prepared by

TRC

Irvine, California

Project No. 94-256

January 1999

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EPA/WDIG CORRESPONDENCE SUMMARY

TECHNICAL MEMORANDUM NO. 6
RESERVOIR LIQUIDS RECOVERY TEST

ORIGINATOR	DOCUMENT	DATE SUBMITTED
EPA	Installation of Ventilation System and Liquids Removal Test	10/21/97
WDIG	Transmittal Technical Memorandum No. 6	11/7/97
EPA	Comments on Technical Memorandum No. 6	11/17/97
EPA	Comments on Well Construction Proposal for Liquids Extraction Well and Soil Vapor Monitoring Wells	11/21/97
WDIG	Transmittal Technical Memorandum No. 6 (Revision 1.0)	11/25/97
EPA	Approval of Technical Memorandum No. 6 (Revision 1.0)	12/3/97
WDIG	Additional Ground Water Well Installations	7/10/98
WDIG	Addendum - TM No. 6 Additional Extraction Wells and Pump Tests	7/10/98
WDIG	Transmittal, Suggested Locations for Additional TM No. 6 Activities	8/4/98
EPA	Approval of Proposed Locations for Additional Extraction Wells	8/5/98

TECHNICAL MEMORANDUM NO. 7
VAPOR WELL CONSTRUCTION DETAILS

ORIGINATOR	DOCUMENT	DATE SUBMITTED
WDIG	Transmittal, Technical Memorandum No. 7	11/25/97
EPA	Approval of Technical Memorandum No. 7	12/3/97
EPA	Additional Comments on Technical Memorandum No. 7 (Vapor Well Construction Details)	12/4/97

TECHNICAL MEMORANDUM NO. 8
ADDITIONAL RESERVOIR LIQUIDS EXTRACTION
WELL AND VAPOR WELL/PROBE SAMPLING

ORIGINATOR	DOCUMENT	DATE SUBMITTED
EPA	Additional Comments on Technical Memorandum No. 8 (Additional Reservoir Liquids Extraction Well/Probe Sampling)	1/9/98
WDIG	Transmittal, Technical Memorandum No. 8 (Revision 1.0)	1/19/98

TECHNICAL MEMORANDA NOS. 6 THROUGH 12
EPA/WDIG CORRESPONDENCE SUMMARY
(Continued)

TECHNICAL MEMORANDUM NO. 9 (REVISION 2.0)
GAS PARAMETER TESTS

ORIGINATOR	DOCUMENT	DATE SUBMITTED
WDIG	Transmittal, Technical Memorandum No. 9 (Revision 1.0)	3/13/98
WDIG	Transmittal, Technical Memorandum No. 9 (Revision 2.0)	4/14/98
EPA	EPA Comments on Technical Memorandum No. 9 (Revision 2.0)	5/12/98

TECHNICAL MEMORANDUM NO. 9A
SOIL VAPOR EXTRACTION TESTING

ORIGINATOR	DOCUMENT	DATE SUBMITTED
WDIG	Transmittal, Technical Memorandum No. 9A, Soil Vapor Extraction Testing	5/28/98
EPA	EPA Approval of Technical Memorandum No. 9A, Soil Vapor Extraction Testing	6/4/98

TECHNICAL MEMORANDUM NO. 10
(REVISION 2.0)
ADDITIONAL SOIL SAMPLING AND LEACHABILITY TESTING

ORIGINATOR	DOCUMENT	DATE SUBMITTED
WDIG	Transmittal, Technical Memorandum No. 10	10/21/98
WDIG	Transmittal, Technical Memorandum No. 10, Revision 1.0	8/25/98
WDIG	Transmittal, Technical Memorandum No. 10, Revision 2.0	9/2/98
EPA	EPA Approval of Technical Memorandum No. 10, Revision 2.0	9/3/98

TECHNICAL MEMORANDUM NO. 11
RESERVIOR AREA GRADING PLANS
AND WASTE/DEBRIS MANAGEMENT

ORIGINATOR	DOCUMENT	DATE SUBMITTED
WDIG	Transmittal, Technical Memorandum No. 11	10/2/98
EPA	Approval of Technical Memorandum No. 11	10/15/98

TECHNICAL MEMORANDA NOS. 6 THROUGH 12
EPA/WDIG CORRESPONDENCE SUMMARY
(Continued)

TECHNICAL MEMORANDUM NO. 12
ADDITIONAL RESERVOIR LIQUIDS RECOVERY
TESTING AND PIEZOMETER ABANDONMENT

ORIGINATOR	DOCUMENT	DATE SUBMITTED
WDIG	Transmittal, Technical Memorandum No. 12	9/18/98
EPA	Comments on Technical Memorandum No. 12	9/28/98

94-256/Tbls&Figs (1/14/99/im)

1.0

TECHNICAL MEMORANDUM NO. 6 (Revision 1.0)
WASTE DISPOSAL, INC. SUPERFUND SITE

SUBJECT: Reservoir Liquids Recovery Test

DATE: November 25, 1997

SUBMITTED TO: Andria Benner, U.S. EPA

PROJECT NO.: 94-256

SUBMITTED BY: Ian Webster, WDIG Project Coordinator

cc:

James Barton, COE
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Roberto Puga, TRC
Stan Smucker, Ph.D., EPA
Kathy Steuer, Esq., EPA, ORC
Dave Taylor, EPA
Marilyn Underwood, Ph.D., CADHS
John Wondolleck, CDM Federal
WDIG Members

1.0 DESCRIPTION OF DESIGN MODIFICATIONS:

1. This Technical Memorandum (TM) No. 6 - Reservoir Liquids Recovery Test, describes the field and analytical procedures proposed to perform an evaluation of the hydraulic yield and chemical characterization of reservoir liquids (free-phase and aqueous phase), specifically those encountered in existing site vapor well VW-09 (Figure 1). This activity is proposed in response to EPA's request in their October 21, 1997 letter to the WDIG Project Coordinator. Additionally, the WDIG concurs that the performance of the proposed activity is an important component of reservoir characterization to determine if liquids management should be incorporated into the design and implementation schedule.

2. The proposed activity will consist of the following sequence of events:
   - Installing one extraction well and four monitoring probes (Figure 1).
   - Monitoring of baseline conditions.
   - Performance of a series of step-pump tests on the newly installed extraction well.
   - Monitoring of free-phase and aqueous phase recovery.
   - Sampling of free-phase and aqueous phase liquids in extraction well and monitoring probes.
   - Sampling of soil gas in extraction well and monitoring probes.
   - Performing drawdown tests and liquids sampling at other wells located within the reservoir.

   Section 3.0 describes the above sequence in more detail and discussed specifications for well design, pumping equipment, monitoring equipment, liquid storage and analytical methods.

3. The data collected will be used to:
   - Characterize the chemistry of encountered reservoir liquids. Delineate chemical and physical characteristic differences between free and aqueous phases.
   - Estimate the hydraulic yield of the saturated portion of the reservoir and extraction well radius of influence.
   - Characterize chemistry of soil gas from evacuated portion of saturated reservoir material, if possible.

   The information gathered will be factored into the remedial design for the site.

2.0 RATIONALE FOR DESIGN MODIFICATIONS:

1. The existence of both free phase and aqueous phase liquids in the reservoir is a site condition that needs to be considered for the development of the remedial design for the site. There is very little existing data from reservoir liquids, other than VW-09 liquids sampling conducted on October 16, 1997 by the WDIG (Attachment A). Given the potential importance of the reservoir liquids with respect to remedial design development, acquiring this data is a critical path activity.

SUBJECT: Reservoir Liquids Recovery Test **DATE:** November 25, 1997

3.0 ENGINEERING MODIFICATIONS TO SUPPORT THE TECHNICAL MEMORANDUM:

1. The location for the liquids recovery test was selected based on the result of liquids sampling of site vapor well VW-09. On October 16, 1997 this well was dewatered by bailing and both free-phase and aqueous phase liquid samples were collected for analysis. The results of both the sampling activity and chemical analyses are included in Attachment A.

2. The results of this previous sampling showed that liquids recovered into well VW-09 at a rate which may allow for short-term dewatering. However, well VW-09 is too small in diameter (i.e., 2 inches) to perform a pump test. Therefore, a new 6-inch diameter extraction well and 2-inch monitoring probes will be constructed. Figures 2 and 3 show the construction details for the new extraction well WDI-EX-1 and monitoring probes WDI-P-1 through -4, respectively. Attachment B includes the well construction diagram for existing well VW-09.

3. The liquid level monitoring probes WDI-P-1 through -4 are placed at 10, 25, 25 and 50 feet from the extraction well, respectively. This probe spacing was selected (with input from EPA's ERT personnel) to monitor the zone of influence created by pumping of the new extraction well. Additionally, the extraction well is situated 10 feet away from existing well VW-09, which will also be utilized as a liquid level monitoring point. Prior to installing the wells, geoprobe data from the test area collected by EPA ERT personnel will be used to accurately identify the bottom of the reservoir.

4. The liquid levels in the wells will be recorded via the use of an oil/water interface probe for the free phase testing and an electronic data logger and liquid level transducers for the aqueous phase testing. Table 1 lists the specifications for the monitoring equipment.

5. Free-phase liquids will be removed from the extraction well using an explosion proof skimmer pump. Aqueous-phase liquids will be removed using a pneumatic pump. The skimmer and pneumatic pumps to be used for the recovery test will be rated for pump rates of <1 gpm to 5 gpm (Table 1). The pumps will be discharged into 1,000-gallon and 6,000-gallon capacity Baker™ tanks, for product and liquid storage, respectively.

6. A free-phase liquids recovery test will be conducted for the following duration(s):

   - Initially, the free-phase liquid will be pumped at approximately a 0.5 gallon per minute rate for a period of 4 hours.
   - If the initial pump rate is sustainable, the extraction rate will be increased to approximately 1.0 gallon per minute for an additional 4 hours.

   At the conclusion of the free-phase pumping test, the recovery rate of the free-phase liquid will be monitored. Aqueous phase testing will not begin until the free-phase liquid product has equilibrated or 24 hours have elapsed, which ever time period is less. During the performance of this free-phase liquid test the level of free product will be monitored. If at any time the thickness of free-phase liquid is insufficient to be extracted with the skimmer pump, the pump will be shut-off and the liquids will be allowed to recover at least fifty percent of the starting level. These cycles will be performed over an 8 hour period, or until such time that liquids are not recharging sufficiently to allow further pumping, which ever time period is less.

7. The liquids recovery test will be conducted as a series of step-drawdown tests. The step series is summarized below:

   - Approximately 0.5 gpm for 4 hours
   - Approximately 1.0 gpm for 4 hours
   - Approximately 2.0 gpm for 4 hours
   - Approximately 4.0 gpm for 12 hours

   For the aqueous phase liquid test, it is likely that the higher pump rates will not be able to be achieved without completely dewatering the well. During the performance of the step test the liquid level in the well will be monitored and if the drawndown level is more than 10 percent of the initial standing water level prior to pumping, higher pump rates will not be attempted. The duration of the test at the highest achievable pump rate will be increased such that a complete 24-hour pumping period is accomplished, if possible. If a situation occurs where a sustainable pump rate is not achievable, the well will be allowed to recharge to at least 80 percent of the original standing water level, then pumped again. This pump/recharge cycle will be continued for at least a 48-hour period, or until such time that liquids are not recharging sufficiently to allow for the pumping, which ever time period is less.

SUBJECT: Reservoir Liquids Recovery Test **DATE:** November 25, 1997

8. The extracted liquids will be stored onsite until such time the chemical analysis of the liquids is complete. The liquids will then be disposed of at an appropriate recycling/disposal facility.

9. Table 2 summarizes the sampling schedule for the test and references appropriate sections of the existing RD Investigative Activities FSAP and QAPP. A new analytical procedure, simulated distillation, is being proposed for characterization for the oil phase only. Attachment C is the procedure that will be followed to perform the oil phase analysis. Table 3 provides a summary of the additional analyses requested by EPA, and their respective method numbers. Since these analyses are being performed for information purposes and to evaluated disposal alternatives, they have not been added to the FSAP or QAPP.

10. Apart from the liquid recovery test described above, a series of short-term bailing and liquids sampling activities will be performed in five additional existing wells within the reservoir limits. These wells will be sampled using the procedures used to sample existing well VW-09, as shown in Figure 4.

11. The results of this activity will be reported to EPA in a Report of Findings. This report will include field observations, data logger printouts, analytical data and discussions of the design implications of the collected data.

4.0 POTENTIAL IMPACTS ON RD FIELD SCHEDULE:

1. This activity will extend the RD Investigative Activities Schedule. Table 4 shows the projected time frame for this activity.

5.0 AMENDMENTS TO QAPP AND SAP TO REFLECT MODIFICATIONS:

1. Attachment C includes the new analytical procedure for simulated distillation, which was not included in the current Revision 3.0 of the QAPP. Table 3 provides a summary of the additional analyses requested by EPA.

LIST OF ATTACHMENTS:

1. Attachment A: Results of VW-09 Sampling
2. Attachment B: VW-09 Construction Details
3. Attachment C: Simulated Distillation Analytical Procedure

RPM APPROVAL STATUS:

BY: ____________________ **DATE:** ____________

_____ **Approved** _____ **Disapproved** _____ **Additional Information Required**

TABLE 1

MATERIALS AND EQUIPMENT SPECIFICATIONS
TM NO. 6
WASTE DISPOSAL, INC. SUPERFUND SITE

MATERIAL/EQUIPMENT DESCRIPTION	SPECIFICATION
Extraction Well	
• Casing	6"-diameter, Type 304 stainless steel
• Screen	0.025" wire wrap, Type 304 stainless steel
• Filter Pack	1/2" Gravel
• Filter Sand	#30 Monterey Sand
• Seal	Bentonite grout
Monitoring Probes	
• Casing	2"-diameter, Schedule 40 PVC
• Screen	0.025" machine-slotted Schedule 40 PVC
• Filter Pack	1/2" Gravel
• Filter Sand	#30 Monterey Sand
• Seal	Bentonite grout
Monitoring Equipment	
• Data Logger	In situ Hermit Model No. 2000
• Transducers	In situ 10 psi rated Model No. PDX-261
• Flow Meter with Totalizer	.25 to 25 gpm
• Landtech (Landfill Gas Analyzer)	Model No. LANGEM-500
• Foxboro (FID/PID)	Model No. TVA-1000
• Oil/Water Interface Probe	Model No. SOL121
Pumping Equipment	
• Pneumatic Pump	Hydrostar Pump (Model No. HS-8001) or equivalent
• Skimmer Pump	Ferret In-well separator (Model No. IWS46) or equivalent.

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TABLE 2

LIQUIDS AND SOIL GAS SAMPLING SCHEDULE AND PROTOCOLS
TM. NO. 6
WASTE DISPOSAL, INC. SUPERFUND SITE

SAMPLE LOCATION	SAMPLE EVENT	SAMPLE FREQUENCY	MEDIA TO BE SAMPLED	ANALYSES REQUIRED	FSAP[1] REFERENCE	QAPP[1] REFERENCE
WDI-EX-1, WDI-P-1 to 4	• Extraction Well Liquids Sampling	• At Start of Test[3] • After 10 Well Volumes are Extracted • At End of Test	• Free Phase and Aqueous Phase[2] • Free Phase and Aqueous Phase[2] • Free Phase and Aqueous Phase[2]	• VOCs • SVOCs • Metals • PCBs/Pesticides • Simulated Distillation (Free Phase Only) • Informational/Disposal Analyses (See Table 3)	• A.5.1.3 Ground Water and Reservoir Liquid Sample Collection • Not Required.	• B.5.2.3.3 Reservoir Liquids Sampling • Attachment C • Not Required.
(See Note)	• Other Reservoir Liquids Well Sampling	• At Start of Test[3] • After Bailing[4]	• Free Phase and Aqueous Phase[2] • Free Phase and Aqueous Phase[2]	• VOCs • SVOCs • Metals • PCBs/Pesticides • Simulated Distillation (Free Phase Only) • Informational/Disposal Analyses (see Table 3)	• A.5.1.3 Ground Water and Reservoir Liquid Sample Collection • Not Required.	• B.5.2.3.3 Reservoir Liquids Sampling • Attachment C • Not Required.
WDI-EX-1, WDI-P-1 to 4	• Soil Gas Sampling	• After Wells are Dewatered	• Soil - Gas	• TO-14 • Methane	• A.3.2 Soil as Sampling	• B.5.2 Sampling Methods Requirements

94-256 (TMs/TM#6Rev1) (11/25/97/ks)

(1) Revision 3.0, submitted September, 1997.
(2) Aqueous samples will be tested unfiltered.
(3) Prior to pumping.
(4) After the well has been purged of liquid.

NOTE: Currently, the WDIG does not have a plan view showing the location of the wells in the reservoir. The WDIG is committing to sampling other reservoir wells. WDIG and EPA will concur as to the locations of these wells.

TABLE 3

LIST OF METHODS AND SAMPLE MATRICES
RESERVOIR LIQUIDS PUMPING TEST
WASTE DISPOSAL, INC. SUPERFUND SITE

PARAMETER	EPA METHOD	AQUEOUS SAMPLES	FREE-PHASE SAMPLES
Oil and Grease	413.2	X	X
Total Petroleum Hydrocarbons (TPH)	418.1	X	X
BTU Heating Value[(1)]	–	–	X
Total Suspended Solids (TSS)	160.2	X	X
Total Dissolved Solids (TDS)	160.1	X	X
Alkalinity			
• Total	310.1	X	–
• Bicarbonate	160.4	X	–
pH	9040	X	–
Hardness	130.2	X	–
Sulfur (Total)	300	X	X
Bacterial Population			
• Population (Aerobic/Anaerobic)	(2)	X	X
• Speciation (Methanogenic/Petroleum Degraders)	(3)	X	X

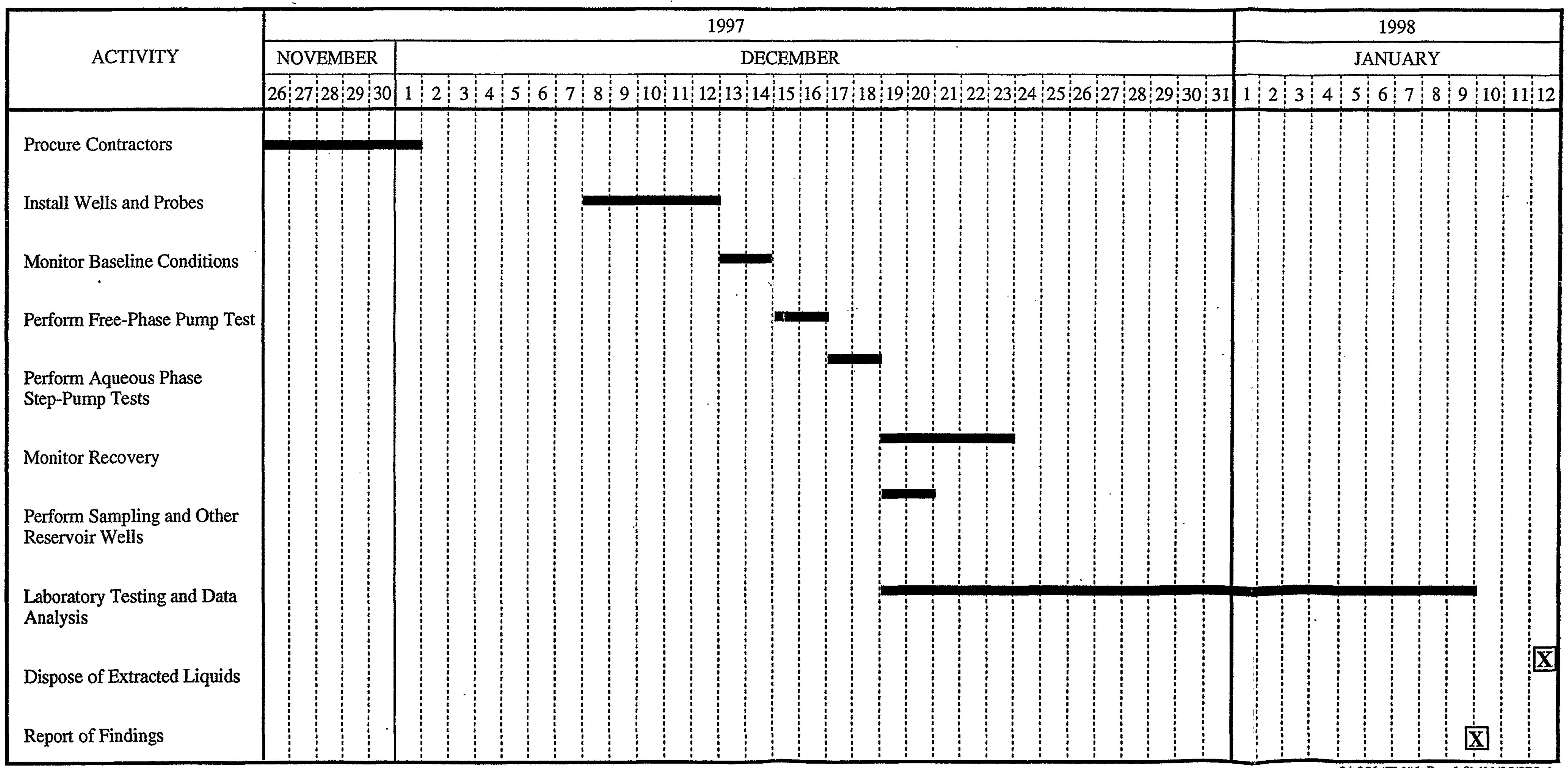
94-256/TM#6(Rev 1.0) (11/25/97/ks)

(1) ASTM Method E-711.
(2) Plate courts will be conducted as per "Compendium of Methods for Microbial Testing" Chapter 9 (Third Edition).
(3) Specification of aerobic and anaerobic bacterial will be performed as per "Compendium of Methods for Microbial Testing" Chapter 12 (Third Edition).

– Not applicable.

TABLE 4

IMPLEMENTATION SCHEDULE
TM NO. 6
WASTE DISPOSAL, INC. SUPERFUND SITE



94-256 (TM#6, Rev 1.0) (11/25/97/ks)

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94-256TM6-05 REV. 11/07/97

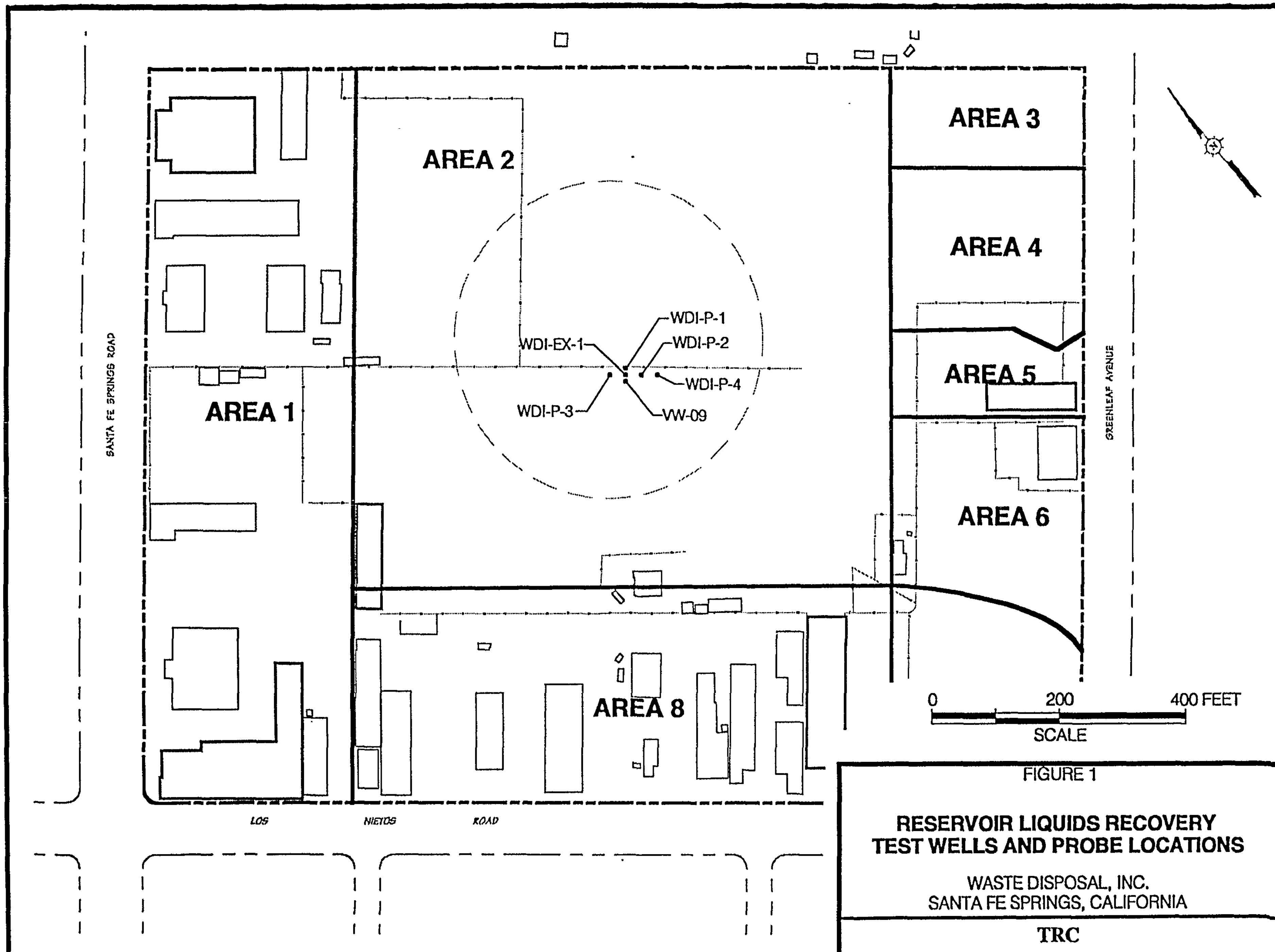
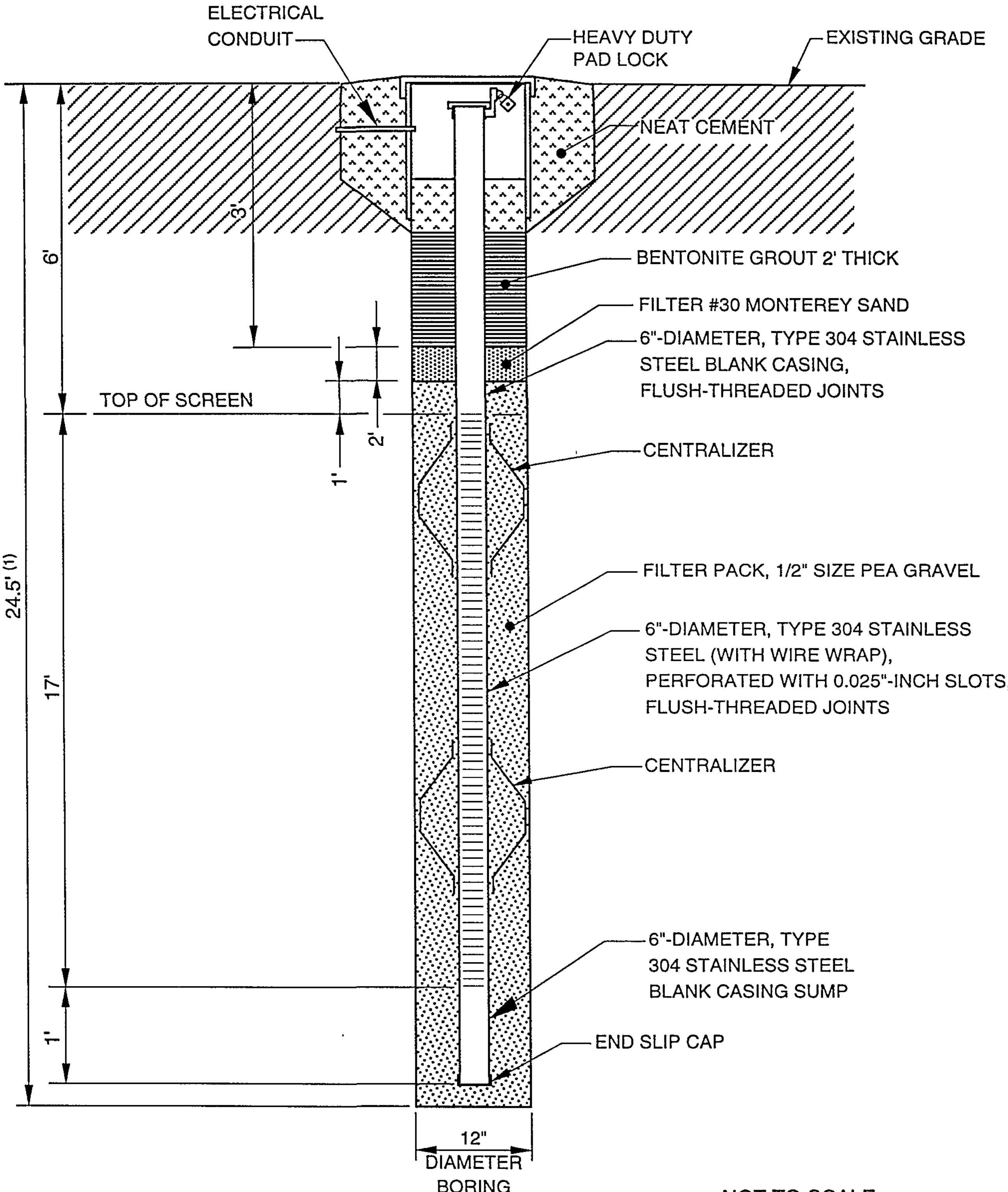


FIGURE 1

RESERVOIR LIQUIDS RECOVERY TEST WELLS AND PROBE LOCATIONS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC



NOT TO SCALE

NOTE:
(1) FINAL DEPTH WILL BE DETERMINED BASED ON GEOPROBE TESTING.

(2) THE CASING WILL BE SUSPENDED DURING CONSTRUCTION TO MINIMIZE CASING CURVATURE.

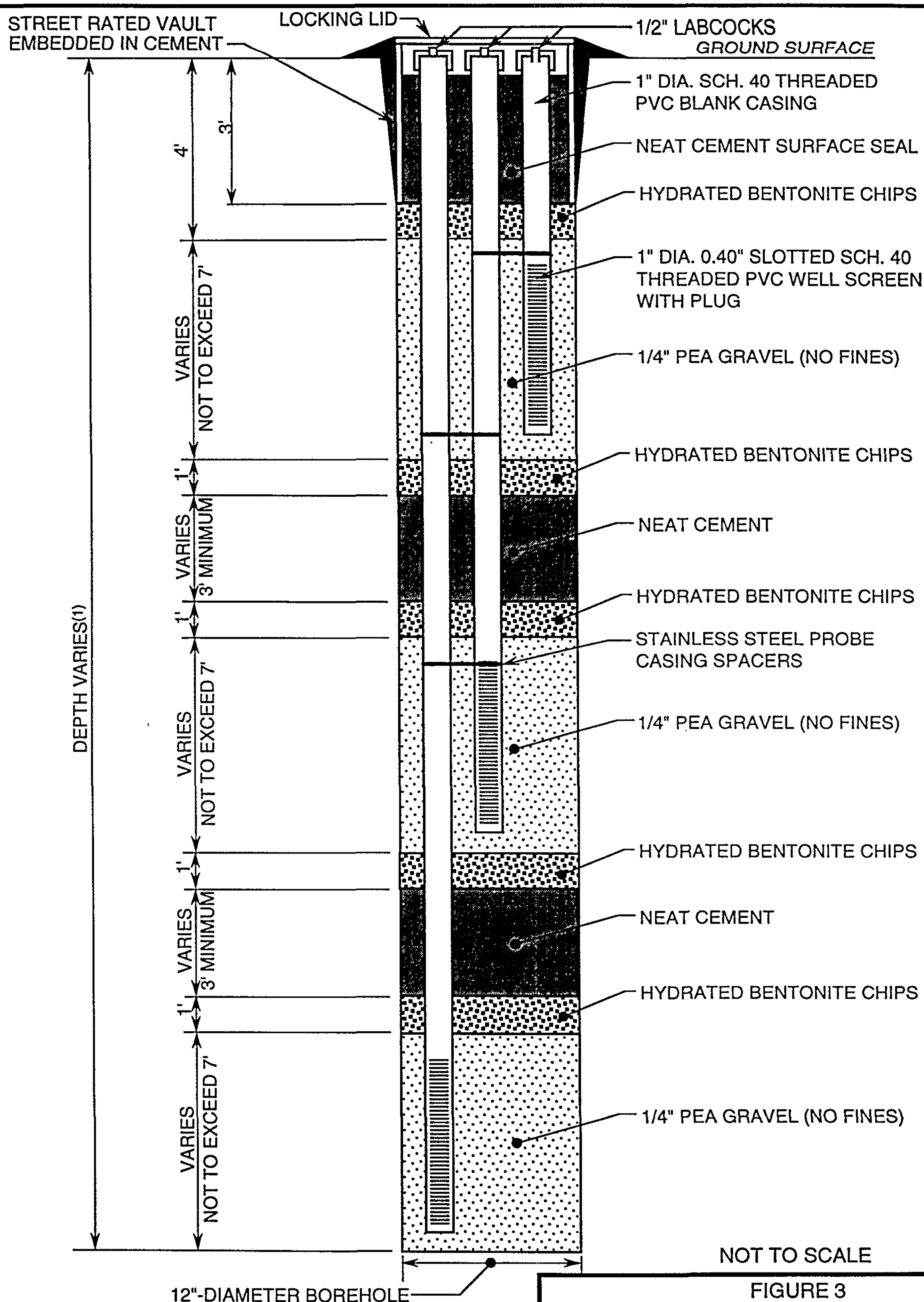
FIGURE 2

TYPICAL CONSTRUCTION DETAILS FOR EXTRACTION WELL WDI-EX-1

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

94-256TM-6-06 REV. 11/20/97



NOTE:
1. WELL DEPTHS AND SCREENED INTERVALS MAY VARY TO ACCOMODATE SUBSURFACE CONDITIONS.

2. THE CASINGS WILL BE SUSPENDED DURING CONSTRUCTION TO MINIMIZE CASING CURVATURE.

3. WELLS COMPLETED IN IMPACTED SOILS WILL HAVE A 1-FOOT THREADED PVC BLANK PLUG TO COLLECT POTENTIAL LIQUIDS.

4. NEAT CEMENT SEAL WILL BE TREMIED INTO BOREHOLE.

FIGURE 3

TYPICAL VAPOR WELL CONSTRUCTION DIAGRAM

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

94-256 TM-6-02 REV. 11/7/97

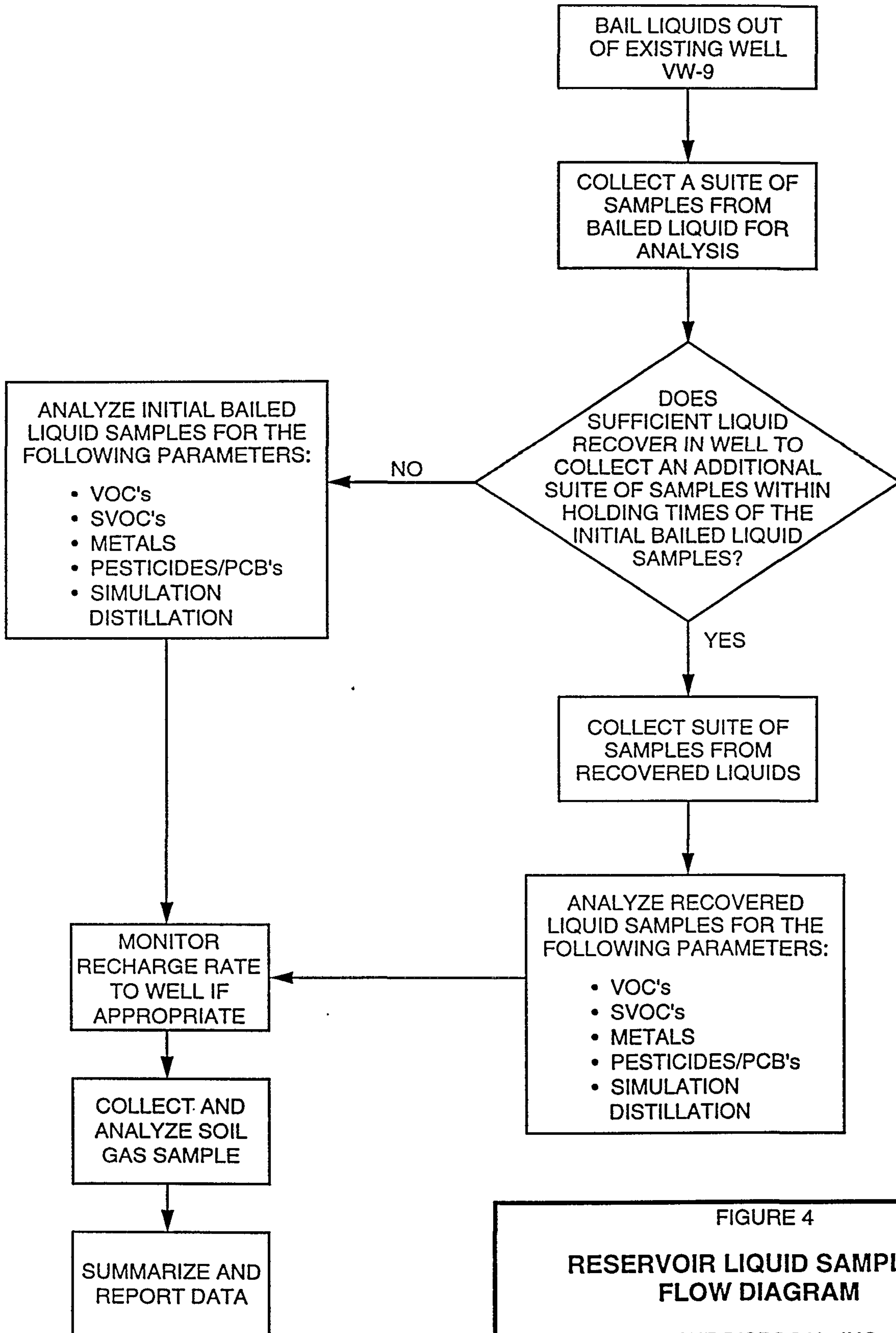


FIGURE 4

RESERVOIR LIQUID SAMPLING FLOW DIAGRAM

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

ATTACHMENT A

RESULTS OF VW-09 SAMPLING

A.1: FIELD NOTES
A.2: LABORATORY ANALYSES RESULTS

TRC

WASTE DISPOSAL INC.
SUPERFUND SITE

Project Coordinator

October 24, 1997

Project No. 94-256

Ms. Andria Benner
U.S. Environmental Protection Agency
75 Hawthorne Street, No. H-7-2
San Francisco, California 94105-3901

Transmittal
Raw Field Notes
Well VW-09 Sampling and Geo-Probe Activities
Waste Disposal, Inc. Superfund Site

Dear Ms. Benner:

Pursuant to the request in your letter of October 21, 1997, enclosed are the raw field notes for the following site activities:

- Well VW-09 Sampling (raw field notes and Chain-of-Custody)
- Area 5 Geo-Probe Activities (raw field notes and handwritten boring logs).

Summarized below are the additional data from the Well VW-09 sampling activity requested in your letter:

• Volume of liquids extracted from VW-09.	Approximately 25 gallons based on the level in the 55-gallon steel drum used to hold the evacuated liquid.
• Number of drums/barrels onsite containing extracted liquids.	One.
• Duration of extraction of liquids from VW-09.	Approximately between 07:35 to 08:57 (via bailer) and 11:22 to 12:20 (via bailer).
• Rate of recovery of liquids in VW-09.	First bailing: Oil recovery rate = 0.1 ft/min Water recovery rate = 0.08 ft/min. Second bailing: Oil recovery rate = 0.08 ft/min Water recovery rate = 0.1 ft/min.
• PID or FID air monitoring data.	PID or FID air monitoring of the well was not performed; a Summa canister sample was collected.
• Copy of Chain-of-Custody forms.	Included.
• Copies of preliminary analytical results.	Not yet available.
• Extraction equipment used to evacuate VW-09.	Used 4-foot long PVC well bailer.

If you have any questions or comments regarding these data please call me at (562) 692-4535.

Sincerely,

Ian Webster RP

Ian A. Webster
WDI Project Coordinator

IAW/JB:ks

cc: Shawn Haddad, DTSC
Pat Hotra, AQMD
Keith Elliot, RWQCB
Andy Lazzaretto, City of Santa Fe Springs
Virginia Maloles, L.A. County DOHS
Darryl Petker, CIWMB
Marilyn Underwood, Ph.D., CADHS
Bill Nelson, ATSDR
Neal Navarro, Army Corps of Engineers
Stan Smucker, Ph.D., EPA
Roberto Puga, TRC
Dave Taylor, EPA
John Wondolleck, CDM Federal
WDIG Members

FIELD ACTIVITY REPORT

WDI	PROJECT NUMBER 94-256	DATE 10/16/97
FIELD ACTIVITY SUBJECT VW-9 Sampling		PAGE 1 OF 2

PROJECT LOCATION Santa Fe Springs CA

SKETCH
Time 0700 temp 78° light sw winds

TIME	DESCRIPTION OF DAILY ACTIVITIES
0700	Arrive on site
	Cal Pac Developing already here
	Checked oil/water level in well
	as 3.94' oil 7.91' water td 23.0
0720	Calibrate the Hydac pH/cond/temp
	meter SN 9101 (Geotech Services) to
	pH 4.0 & 7.0
0735	10' S.S. bailer will not go to
	bottom of well, probably a kink
	in the well casing. Removed one
	5' section with no affect. Switched to a 4' PVC bailer which is working
	well.
0835	oil level @ 18.8' water @ 20.3'
0857	Well dewatered
0901	Replaced sampling cap on well and pulled vacuum on well using a
	vacuum pump, trap and flow meter. Pulled vacuum for 5 min @ 3 LPM
0906	Removed pumping system and collect suma canister sample
0919	oil level @ 19.18 water @ 19.86
0944	oil level @ 16.20 water @ 17.12
1040	oil level @ 10.12 water @ 13.07
1100	Collected water samples for analytical testing. Collected (2) 1L bottles of
	the oil layer for possible characterization pH 10.63 cond 3250 uS temp 78.5°F
1122	Dewatered well again
1231	oil level @ 1410 water @ 19.61
1315	oil level @ 1019 water @ 12.92 1400 oil 7.37 water 9.92

THIS FIELD REPORT PROVIDES ONLY THE RESULTS OF OBSERVATIONS AND TESTS BY ENVIRONMENTAL SOLUTIONS, INC. PERSONNEL. THIS REPORT SHOULD NOT BE CONSTRUED AS SUPERVISION, DIRECTION, OR A RECOMMENDATION.

Prepared By: Glenn Anderson
Date/Time: 10/16/97 1515

ENVIRONMENTAL SOLUTIONS, INC.
21 Technology Drive
Irvine, California 92718

1515	Left site for VOC labs

FIELD ACTIVITY REPORT

WD1	PROJECT NUMBER 94-256	DATE 10/16/97
FIELD ACTIVITY SUBJECT VW-9 Sampling		PAGE 2 OF 2

PROJECT LOCATION

TIME	DESCRIPTION OF DAILY ACTIVITIES
1430	Sampled water layer again pH 10.47
	labeled WD1-VW-09-2 Cond 3080 Temp 77.8
1500	Photographed well and sampling
	equipment
1515	Left site for VOC labs

SKETCH

THIS FIELD REPORT PROVIDES ONLY THE RESULTS OF OBSERVATIONS AND TESTS BY ENVIRONMENTAL SOLUTIONS, INC. PERSONNEL. THIS REPORT SHOULD NOT BE CONSTRUED AS SUPERVISION, DIRECTION, OR A RECOMMENDATION.

Prepared By: Glenn Anderson

Date/Time: 10/16/97 1515

ENVIRONMENTAL SOLUTIONS, INC.
21 Technology Drive
Irvine, California 92718

VOC Analytical Laboratories, Inc.

Fax Cover

This is a confidential message, intended solely for the person to whom it is addressed. If you receive this message in error, please forward it to the correct person, or mail it back to us. Thank you.

To	Richard Scott / TRC
Fax No.	(714) 727-7399
From	Roobik Yaghoubi
Date/Time	11-12-97
Subject	Result
Pages	19

MESSAGE:

801 Western Avenue
Glendale, CA 91201

(818) 247-5737 Tel.
(818) 247-9797 Fax

ANALYTICAL REPORT

LOG NO: G97-10-363

Received: 16 OCT 97

Mailed:

Mr. Roberto Puga
Environmental Solutions, Inc.
21 Technology Drive
Irvine, CA 92718

Project: 94-256

PARTIAL
REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, VAPOR SAMPLES	DATE SAMPLED
10-363-1	WDI-VW-09	16 OCT 97

PARAMETER	10-363-1
Methane TO-14	

VOC Analytical Laboratories, Inc.
801 Western Avenue, Glendale, CA 91201 - Phone: (818) 247-5737 - Fax: (818) 247-9797

LOG NO: G97-10-363

Received: 16 OCT 97

Mr. Roberto Puga
Environmental Solutions, Inc.
21 Technology Drive
Irvine, CA 92718

Project: 94-256

PARTIAL
REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, AQUEOUS SAMPLES	DATE SAMPLED
10-363-2	WDI-VW-09	16 OCT 97
10-363-3	WDI-VW-09-2	16 OCT 97

PARAMETER	10-363-2	10-363-3
Digestion (3010), Date	10/21/97	10/21/97
Furnace Digestion (3020), Date	10/21/97	10/21/97
Arsenic (7060), mg/L	0.19	0.16
Antimony (6010), mg/L	<0.1	<0.1
Barium (6010), mg/L	0.41	0.16
Beryllium (6010), mg/L	<0.001	<0.001
Cadmium (6010), mg/L	<0.005	<0.005
Chromium (6010), mg/L	0.011	<0.01
Cobalt (6010), mg/L	<0.04	<0.04
Copper (6010), mg/L	0.030	<0.02
Lead (7421), mg/L	0.025	0.018
Mercury (7470), mg/L	<0.0002	<0.0002
Molybdenum (6010), mg/L	0.54	0.43
Nickel (6010), mg/L	0.094	0.12
Selenium (7740), mg/L	<0.004	<0.004
Silver (6010), mg/L	<0.01	<0.01
Thallium (6010), mg/L	<0.07	<0.07
Vanadium (6010), mg/L	<0.04	<0.04
Zinc (6010), mg/L	0.030	0.016
Aluminum (6010), mg/L	4.3	2.1
Calcium (6010), mg/L	31	16
Iron (6010), mg/L	2.8	1.0

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PARTIAL
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LOG NO	SAMPLE DESCRIPTION, AQUEOUS SAMPLES	DATE SAMPLED
10-363-2	WDI-VW-09	16 OCT 97
10-363-3	WDI-VW-09-2	16 OCT 97

PARAMETER	10-363-2	10-363-3
B/N,A Ext.Pri.Poll. (8270)		
Date Analyzed	10/31/97	10/31/97
Date Extracted	10/20/97	10/20/97
Dilution Factor, Times	50	50
1,2,4-Trichlorobenzene, ug/L	<300	<300
1,2-Dichlorobenzene, ug/L	<300	<300
1,2-Diphenylhydrazine, ug/L	<300	<300
1,3-Dichlorobenzene, ug/L	<300	<300
1,4-Dichlorobenzene, ug/L	<300	<300
2,4,5-Trichlorophenol, ug/L	<300	<300
2,4,6-Trichlorophenol, ug/L	<300	<300
2,4-Dichlorophenol, ug/L	<300	<300
2,4-Dimethylphenol, ug/L	700	620
2,4-Dinitrophenol, ug/L	<500	<500
2,4-Dinitrotoluene, ug/L	<300	<300
2,6-Dinitrotoluene, ug/L	<300	<300
2-Chloronaphthalene, ug/L	<300	<300
2-Chlorophenol, ug/L	<300	<300
2-Methyl-4,6-dinitrophenol, ug/L	<500	<500
2-Methylnaphthalene, ug/L	890	970
2-Methylphenol (o-Cresol), ug/L	690	620
2-Nitroaniline, ug/L	<300	<300
2-Nitrophenol, ug/L	<300	<300
3,3'-Dichlorobenzidine, ug/L	<500	<500
3-Nitroaniline, ug/L	<300	<300
4-Bromophenylphenylether, ug/L	<300	<300

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10-363-2	WDI-VW-09	16 OCT 97
10-363-3	WDI-VW-09-2	16 OCT 97

PARAMETER	10-363-2	10-363-3
4-Chloro-3-methylphenol, ug/L	<300	<300
4-Chloroaniline, ug/L	<300	<300
4-Chlorophenylphenylether, ug/L	<300	<300
4-Methylphenol (p-Cresol), ug/L	1400	1800
4-Nitroaniline, ug/L	<300	<300
4-Nitrophenol, ug/L	<500	<500
Acenaphthene, ug/L	<300	<300
Acenaphthylene, ug/L	<300	<300
Aniline, ug/L	<300	<300
Anthracene, ug/L	<300	<300
Benzidine, ug/L	<5000	<5000
Benzo(a)anthracene, ug/L	<300	<300
Benzo(a)pyrene, ug/L	<300	<300
Benzo(b)fluoranthene, ug/L	<300	<300
Benzo(g,h,i)perylene, ug/L	<300	<300
Benzo(k)fluoranthene, ug/L	<300	<300
Benzyl Alcohol, ug/L	1000	<500
Benzoic acid, ug/L	<3000	<3000
Butylbenzylphthalate, ug/L	<300	<300
Chrysene, ug/L	<300	<300
Di-n-octylphthalate, ug/L	<300	<300
Dibenzo(a,h)anthracene, ug/L	<300	<300
Dibenzofuran, ug/L	<300	<300
Dibutylphthalate, ug/L	<500	<500
Diethylphthalate, ug/L	<500	<500
Dimethylphthalate, ug/L	<300	<300

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10-363-2	WDI-VW-09	16 OCT 97
10-363-3	WDI-VW-09-2	16 OCT 97

PARAMETER	10-363-2	10-363-3
Fluoranthene, ug/L	<300	<300
Fluorene, ug/L	<300	<300
Hexachlorobenzene, ug/L	<300	<300
Hexachlorobutadiene, ug/L	<300	<300
Hexachlorocyclopentadiene, ug/L	<500	<500
Hexachloroethane, ug/L	<300	<300
Indeno(1,2,3-c,d)pyrene, ug/L	<300	<300
Isophorone, ug/L	<300	<300
N-Nitrosodimethylamine, ug/L	<300	<300
N-Nitrosodiphenylamine, ug/L	<300	<300
N-Nitrosodi-n-propylamine, ug/L	<300	<300
Nitrobenzene, ug/L	<300	<300
Naphthalene, ug/L	620	620
Phenanthrene, ug/L	<300	<300
Phenol, ug/L	1000	1100
Pentachlorophenol, ug/L	<500	<500
Pyrene, ug/L	<300	<300
Pyridine, ug/L	<500	<500
Bis(2-chloroethoxy)methane, ug/L	<300	<300
Bis(2-chloroethyl)ether, ug/L	<300	<300
Bis(2-chloroisopropyl)ether, ug/L	<300	<300
Bis(2-ethylhexyl)phthalate, ug/L	<500	<500
Surrogates **		
2-Fluorobiphenyl Reported, ug/L	0 NC	0 NC
2-Fluorobiphenyl Theo., ug/L	50.0	50.0
2-Fluorophenol Reported, ug/L	0 NC	0 NC

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10-363-2	WDI-VW-09	16 OCT 97
10-363-3	WDI-VW-09-2	16 OCT 97

PARAMETER	10-363-2	10-363-3
2-Fluorophenol Theoretical, ug/L	75.0	75.0
2,4,6-Tribromophenol Rep., ug/L	0 NC	0 NC
2,4,6-Tribromophenol Theo., ug/L	75.0	75.0
Nitrobenzene-d5 Reported, ug/L	0 NC	0 NC
Nitrobenzene-d5 Theoretical, ug/L	50.0	50.0
Phenol-d5 Reported, ug/L	0 NC	0 NC
Phenol-d5 Theoretical, ug/L	75.0	75.0
Terphenyl-d14 Reported, ug/L	0 NC	0 NC
Terphenyl-d14 Theoretical, ug/L	50.0	50.0

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10-363-2	WDI-VW-09	16 OCT 97
10-363-3	WDI-VW-09-2	16 OCT 97

PARAMETER	10-363-2	10-363-3
Pesticides (8080)		
Date Analyzed	10/23/97	10/23/97
Date Extracted	10/22/97	10/22/97
Dilution Factor, Times	10	10
Aldrin, ug/L	<0.3	<0.3
Chlordane, ug/L	<6	<6
p,p'-DDD, ug/L	<0.2	<0.2
p,p'-DDE, ug/L	0.39	<0.2
p,p'-DDT, ug/L	<0.4	<0.4
Dieldrin, ug/L	<0.2	<0.2
Endosulfan I, ug/L	<0.2	<0.2
Endosulfan II, ug/L	<0.2	<0.2
Endosulfan sulfate, ug/L	<0.5	<0.5
Endrin, ug/L	<0.2	<0.2
Endrin aldehyde, ug/L	<0.2	<0.2
Endrin Ketone, ug/L	<0.2	<0.2
Heptachlor epoxide, ug/L	<0.3	<0.3
Heptachlor, ug/L	<0.2	<0.2
Methoxychlor, ug/L	<0.3	<0.3
Toxaphene, ug/L	<20	<20
BHC, alpha isomer, ug/L	<0.3	<0.3
BHC, beta isomer, ug/L	<0.3	<0.3
BHC, delta isomer, ug/L	<0.2	<0.2
BHC, gamma isomer (Lindane), ug/L	<0.2	<0.2
Surrogates **		
Decachlorobiphenyl Reported, ug/L	0 NC	0 NC

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10-363-2	WDI-VW-09	16 OCT 97
10-363-3	WDI-VW-09-2	16 OCT 97

PARAMETER	10-363-2	10-363-3
Decachlorobiphenyl Theoretical, ug/L	0.250	0.250
Tetrachloro-meta-xylene Rpt., ug/L	0 NC	0 NC
Tetrachloro-meta-xylene Theor., ug/L	0.250	0.250

VOC Analytical Laboratories, Inc.
801 Western Avenue, Glendale, CA 91201 - Phone: (818) 247-5737 - Fax: (818) 247-9797

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10-363-2	WDI-VW-09	16 OCT 97
10-363-3	WDI-VW-09-2	16 OCT 97

PARAMETER	10-363-2	10-363-3
Volatile Organics (8260A)		
Date Analyzed	10/20/97	10/20/97
Dilution Factor, Times	1	1
1,1,1-Trichloroethane, ug/L	<0.5	<0.5
1,1,2,2-Tetrachloroethane, ug/L	<0.5	<0.5
1,1,2-Trichloroethane, ug/L	<0.5	<0.5
1,1-Dichloroethane, ug/L	<0.5	<0.5
1,1-Dichloroethene, ug/L	<0.5	<0.5
1,2-Dibromoethane, ug/L	<0.5	<0.5
1,2-Dichloroethane, ug/L	<0.5	<0.5
1,2-Dichloropropane, ug/L	<0.5	<0.5
2-Chloroethylvinylether, ug/L	<4	<4
2-Hexanone, ug/L	<5	<5
Acetone, ug/L	350	400
Bromodichloromethane, ug/L	<0.5	<0.5
Bromomethane, ug/L	<0.5	<0.5
Benzene, ug/L	760	820
Bromoform, ug/L	<0.5	<0.5
Carbon Tetrachloride, ug/L	<0.5	<0.5
Chloroethane, ug/L	<0.5	<0.5
Chloroform, ug/L	<0.5	<0.5
Chloromethane, ug/L	<1	<1
Carbon Disulfide, ug/L	72	83
Dibromochloromethane, ug/L	<0.5	<0.5
Methyl ethyl ketone, ug/L	1800	1800
Methyl isobutyl ketone, ug/L	820	940

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10-363-2	WDI-VW-09	16 OCT 97
10-363-3	WDI-VW-09-2	16 OCT 97

PARAMETER	10-363-2	10-363-3
Methylene chloride, ug/L	<2	<2
Trichloroethene, ug/L	11	13
Tetrachloroethene, ug/L	<0.5	<0.5
Vinyl acetate, ug/L	<5	<5
Vinyl chloride, ug/L	11	17
cis-1,2-Dichloroethene, ug/L	110	160
cis-1,3-Dichloropropene, ug/L	<0.5	<0.5
trans-1,2-Dichloroethene, ug/L	2.0	2.2
trans-1,3-Dichloropropene, ug/L	<0.5	<0.5
Surrogates **		
4-Bromofluorobenzene Rep., ug/L	42.3	44.7
4-Bromofluorobenzene Theo., ug/L	50.0	50.0
Toluene-d8 Reported, ug/L	55.4	52.3
Toluene-d8 Theo., ug/L	50.0	50.0
Dibromofluoromethane Rep., ug/L	43.4	42.6
Dibromofluoromethane Theo., ug/L	50.0	50.0

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LOG NO	SAMPLE DESCRIPTION, NON-AQUEOUS SAMPLES	DATE SAMPLED
10-363-4	WDI-VW-09-Oil	16 OCT 97

PARAMETER	10-363-4
Semi-volatiles (8270)	
Date Analyzed	11/03/97
Date Extracted	10/31/97
Dilution Factor, Times	900
1,2,4-Trichlorobenzene, mg/kg	<200
1,2-Dichlorobenzene, mg/kg	<200
1,2-Diphenylhydrazine, mg/kg	<200
1,3-Dichlorobenzene, mg/kg	<200
1,4-Dichlorobenzene, mg/kg	<200
2,4,5-Trichlorophenol, mg/kg	<200
2,4,6-Trichlorophenol, mg/kg	<200
2,4-Dichlorophenol, mg/kg	<200
2,4-Dimethylphenol, mg/kg	<200
2,4-Dinitrophenol, mg/kg	<400
2,4-Dinitrotoluene, mg/kg	<200
2,6-Dinitrotoluene, mg/kg	<200
2-Chloronaphthalene, mg/kg	<200
2-Chlorophenol, mg/kg	<200
2-Methyl-4,6-dinitrophenol, mg/kg	<400
2-Methylnaphthalene, mg/kg	1500
2-Methylphenol (o-Cresol), mg/kg	<200
2-Nitroaniline, mg/kg	<200
2-Nitrophenol, mg/kg	<200
3,3'-Dichlorobenzidine, mg/kg	<600
3-Nitroaniline, mg/kg	<200
4-Bromophenylphenylether, mg/kg	<200
4-Chloro-3-methylphenol, mg/kg	<200

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LOG NO	SAMPLE DESCRIPTION, NON-AQUEOUS SAMPLES	DATE SAMPLED
10-363-4	WDI-VW-09-Oil	16 OCT 97

PARAMETER	10-363-4
4-Chloroaniline, mg/kg	<200
4-Chlorophenylphenylether, mg/kg	<200
4-Methylphenol (p-Cresol), mg/kg	<400
4-Nitroaniline, mg/kg	<200
4-Nitrophenol, mg/kg	<400
Acenaphthene, mg/kg	<200
Acenaphthylene, mg/kg	<200
Aniline, mg/kg	<200
Anthracene, mg/kg	<200
Benzidine, mg/kg	<4000
Benzo(a)anthracene, mg/kg	<200
Benzo(a)pyrene, mg/kg	<200
Benzo(b)fluoranthene, mg/kg	<200
Benzo(g,h,i)perylene, mg/kg	<200
Benzo(k)fluoranthene, mg/kg	<200
Benzyl Alcohol, mg/kg	<400
Benzoic acid, mg/kg	<2000
Butylbenzylphthalate, mg/kg	<200
Chrysene, mg/kg	<200
Di-n-octylphthalate, mg/kg	<200
Dibenzo(a,h)anthracene, mg/kg	<200
Dibenzofuran, mg/kg	<200
Dibutylphthalate, mg/kg	<200
Diethylphthalate, mg/kg	<200
Dimethylphthalate, mg/kg	<200
Fluoranthene, mg/kg	<200
Fluorene, mg/kg	<200

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10-363-4	WDI-VW-09-Oil	16 OCT 97

PARAMETER	10-363-4
Hexachlorobenzene, mg/kg	<200
Hexachlorobutadiene, mg/kg	<200
Hexachlorocyclopentadiene, mg/kg	<400
Hexachloroethane, mg/kg	<200
Indeno(1,2,3-c,d)pyrene, mg/kg	<200
Isophorone, mg/kg	<200
N-Nitrosodimethylamine, mg/kg	<200
N-Nitrosodiphenylamine, mg/kg	<200
N-Nitrosodi-n-propylamine, mg/kg	<200
Nitrobenzene, mg/kg	<200
Naphthalene, mg/kg	740
Phenanthrene, mg/kg	320
Phenol, mg/kg	<200
Pentachlorophenol, mg/kg	<400
Pyrene, mg/kg	<200
Pyridine, mg/kg	<400
Bis(2-chloroethoxy)methane, mg/kg	<200
Bis(2-chloroethyl)ether, mg/kg	<200
Bis(2-chloroisopropyl)ether, mg/kg	<200
Bis(2-ethylhexyl)phthalate, mg/kg	<400
Surrogates **	
2-Fluorobiphenyl Reported, mg/kg	0 NC
2-Fluorobiphenyl Theo., mg/kg	1.67
2-Fluorophenol Reported, mg/kg	0 NC
2-Fluorophenol Theoretical, mg/kg	2.50
2,4,6-Tribromophenol Rep., mg/kg	0 NC
2,4,6-Tribromophenol Theo., mg/kg	2.50

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10-363-4	WDI-VW-09-Oil	16 OCT 97

PARAMETER	10-363-4
Nitrobenzene-d5 Reported, mg/kg	0 NC
Nitrobenzene-d5 Theoretical, mg/kg	1.67
Phenol-d5 Reported, mg/kg	0 NC
Phenol-d5 Theoretical, mg/kg	2.50
Terphenyl-d14 Reported, mg/kg	0 NC
Terphenyl-d14 Theoretical, mg/kg	1.67
Volatile Organics	

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LOG NO	SAMPLE DESCRIPTION, NON-AQUEOUS SAMPLES	DATE SAMPLED
10-363-4	WDI-VW-09-Oil	16 OCT 97

PARAMETER	10-363-4
Simulated Distillation (D2887)	
Sample Amount, g	1G
Extract Volume, mL	30ML
Dilution Factor, Times	1200
C10-C11, mg/kg	41000
C12-C13, mg/kg	61000
C14-C15, mg/kg	58000
C16-C17, mg/kg	60000
C18-C19, mg/kg	40000
C20-C23, mg/kg	100000
C24-C27, mg/kg	73000
C28-C31, mg/kg	83000
C32-C35, mg/kg	68000
C36-C39, mg/kg	32000
C40-C43, mg/kg	<200
C44+, mg/kg	<200
Total Hydrocarbon Matrix, mg/kg	620000
Other Simulated Distillation (D2887)	---
Surrogates **	
Naphthalene Reported, mg/kg	0 NC
Naphthalene Theoretical, mg/kg	10.0
o-Terphenyl Reported, mg/kg	0 NC
o-Terphenyl Theoretical, mg/kg	10.0

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LOG NO	SAMPLE DESCRIPTION, AQUEOUS SAMPLES	DATE SAMPLED
10-363-5	WDI-VW-TB-09	16 OCT 97

PARAMETER	10-363-5
Volatile Organics (8260A)	
Date Analyzed	10/20/97
Dilution Factor, Times	1
1,1,1-Trichloroethane, ug/L	<0.5
1,1,2,2-Tetrachloroethane, ug/L	<0.5
1,1,2-Trichloroethane, ug/L	<0.5
1,1-Dichloroethane, ug/L	<0.5
1,1-Dichloroethene, ug/L	<0.5
1,2-Dibromoethane, ug/L	<0.5
1,2-Dichloroethane, ug/L	<0.5
1,2-Dichloropropane, ug/L	<0.5
2-Chloroethylvinylether, ug/L	<4
2-Hexanone, ug/L	<5
Acetone, ug/L	<10
Bromodichloromethane, ug/L	<0.5
Bromomethane, ug/L	<0.5
Benzene, ug/L	<0.5
Bromoform, ug/L	<0.5
Carbon Tetrachloride, ug/L	<0.5
Chloroethane, ug/L	<0.5
Chloroform, ug/L	<0.5
Chloromethane, ug/L	<1
Carbon Disulfide, ug/L	<2
Dibromochloromethane, ug/L	<0.5
Methyl ethyl ketone, ug/L	<10
Methyl isobutyl ketone, ug/L	<4
Methylene chloride, ug/L	<2

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LOG NO	SAMPLE DESCRIPTION, AQUEOUS SAMPLES	DATE SAMPLED
10-363-5	WDI-VW-TB-09	16 OCT 97

PARAMETER	10-363-5
Trichloroethene, ug/L	<0.5
Tetrachloroethene, ug/L	<0.5
Vinyl acetate, ug/L	<5
Vinyl chloride, ug/L	<0.5
cis-1,2-Dichloroethene, ug/L	<0.5
cis-1,3-Dichloropropene, ug/L	<0.5
trans-1,2-Dichloroethene, ug/L	<0.5
trans-1,3-Dichloropropene, ug/L	<0.5
Surrogates **	
4-Bromofluorobenzene Rep., ug/L	41.7
4-Bromofluorobenzene Theo., ug/L	50.0
Toluene-d8 Reported, ug/L	45.4
Toluene-d8 Theo., ug/L	50.0
Dibromofluoromethane Rep., ug/L	45.8
Dibromofluoromethane Theo., ug/L	50.0

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LOG NO	SAMPLE DESCRIPTION, AQUEOUS SAMPLES	DATE SAMPLED
10-363-6	WDI-VW-09 Dissolved	16 OCT 97
10-363-7	WDI-VW-09-2 Dissolved	16 OCT 97

PARAMETER	10-363-6	10-363-7
Digestion (3010), Date	10/21/97	10/21/97
Furnace Digestion (3020), Date	10/21/97	10/21/97
Arsenic (7060), mg/L	0.20	0.19
Antimony (6010), mg/L	<0.1	<0.1
Barium (6010), mg/L	0.079	0.089
Beryllium (6010), mg/L	<0.001	<0.001
Cadmium (6010), mg/L	<0.03	<0.005
Chromium (6010), mg/L	<0.01	<0.01
Cobalt (6010), mg/L	<0.04	<0.04
Copper (6010), mg/L	<0.02	<0.02
Lead (7421), mg/L	0.0042	0.0068
Mercury (7470), mg/L	<0.0002	<0.0002
Molybdenum (6010), mg/L	0.57	0.49
Nickel (6010), mg/L	0.088	0.12
Selenium (7740), mg/L	<0.004	<0.004
Silver (6010), mg/L	<0.01	<0.01
Thallium (6010), mg/L	<0.07	<0.07
Vanadium (6010), mg/L	<0.04	<0.04
Zinc (6010), mg/L	<0.01	<0.01
Aluminum (6010), mg/L	1.7	1.5
Calcium (6010), mg/L	5.6	15
Iron (6010), mg/L	0.65	0.57
Date Filtered	10/17/97	10/17/97

Ship To: VOC Analytical
Attn: Sample Control
801 Western
Glendale CA

Page 1 of ____
Project Name: WDI
Project No.: 94.256
Site Location: Santa Fe Springs CA
Date: 10/16/97

CHAIN OF CUSTODY RECORD

00588

Boring/Well No.	Sample No.	Depth	Date	Time	Sample Type: Water	Solid	Other	Comp.	Grab.	Sample Containers: Vol.	No.	Type	Pres.	Analysis: VOC's (TO-14)	Methane (SCAQMD 25)	8260	8270	Total Metals	Dissolved Metals	Hold	Remarks
WDI-VW	1-09		10/16/97	0900			Air			1l	1	Sum		X	X						
WDI-VW	1-09		10/16/97	1100	X					40ml	2	VOA	HCl			X					
↓			↓	↓	↓					1l	2	Ambr	—				X				
										1l	1	Poly	HNO3					X			
↓			↓	↓	↓					1l	1	"	—						X		*Filter at lab
WDI-VW	TB-09		10/16/97	1105	X					40ml	2	VOA	HCl			X					
WDI-VW	-09-Oil		10/16/97	1100			Oil			1l	2	Ambr	—							X	
WDI-VW	-09-2		10/16/97	1430	X					40ml	2	VOA	HCl			X					
↓			↓	↓	↓					1l	2	Ambr	—				X				
										1l	1	Poly	HNO3					X			
↓			↓	↓	↓					1l	1	Poly	—						X		*Filter at lab

Total Number of Samples Shipped: 17 Shipper's Signature: Glenn Ondrovsker

	Signature	Company	Date	Time
Relinquished by:	Glenn Ondrovsker	TRC	10/16/97	1608
Received by:	[illegible]	VOC	10/16/97	1608
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Special Instructions / Shipment / Handling/ Storage Requirements:

Send results attn. Roberto Puga

The material(s) listed are received for analysis and/or treatability evaluation and remain the property of the client and not Environmental Solutions, Inc. At the conclusion of the test work, all remaining material(s) will be returned to the client for eventual disposal at a licensed facility.

☒ ENVIRONMENTAL SOLUTIONS, INC.
21 Technology Drive
Irvine, California 92718

☐ ENVIRONMENTAL SOLUTIONS, INC.
1172 Pelican Bay Drive
Daytona Beach, Florida 32119

☐ ENVIRONMENTAL SOLUTIONS, INC.
1201 N. McDowell Boulevard
Petaluma, California 94954

☐ ENVIRONMENTAL SOLUTIONS, INC.
2815 Mitchell Drive, Suite 103
Walnut Creek, California 94598

ATTACHMENT B

EXISTING VAPOR WELL VW-09
CONSTRUCTION DIAGRAM

EBASCO SERVICES INCORPORATED EBASCO

3000 W. MacArthur Blvd., Santa Ana, CA 92704, (714) 662-4000

MONITORING WELL INSTALLATION REPORT

WELL NUMBER: VW-09

PROJECT NAME: Waste Disposal, Inc.

ADDRESS: 9648 Santa Fe Springs Rd.
Santa Fe Springs, California

TYPE OF WELL: Vadose Gas Monitoring Well

INSTALLATION CONTRACTOR: Datum Exploration

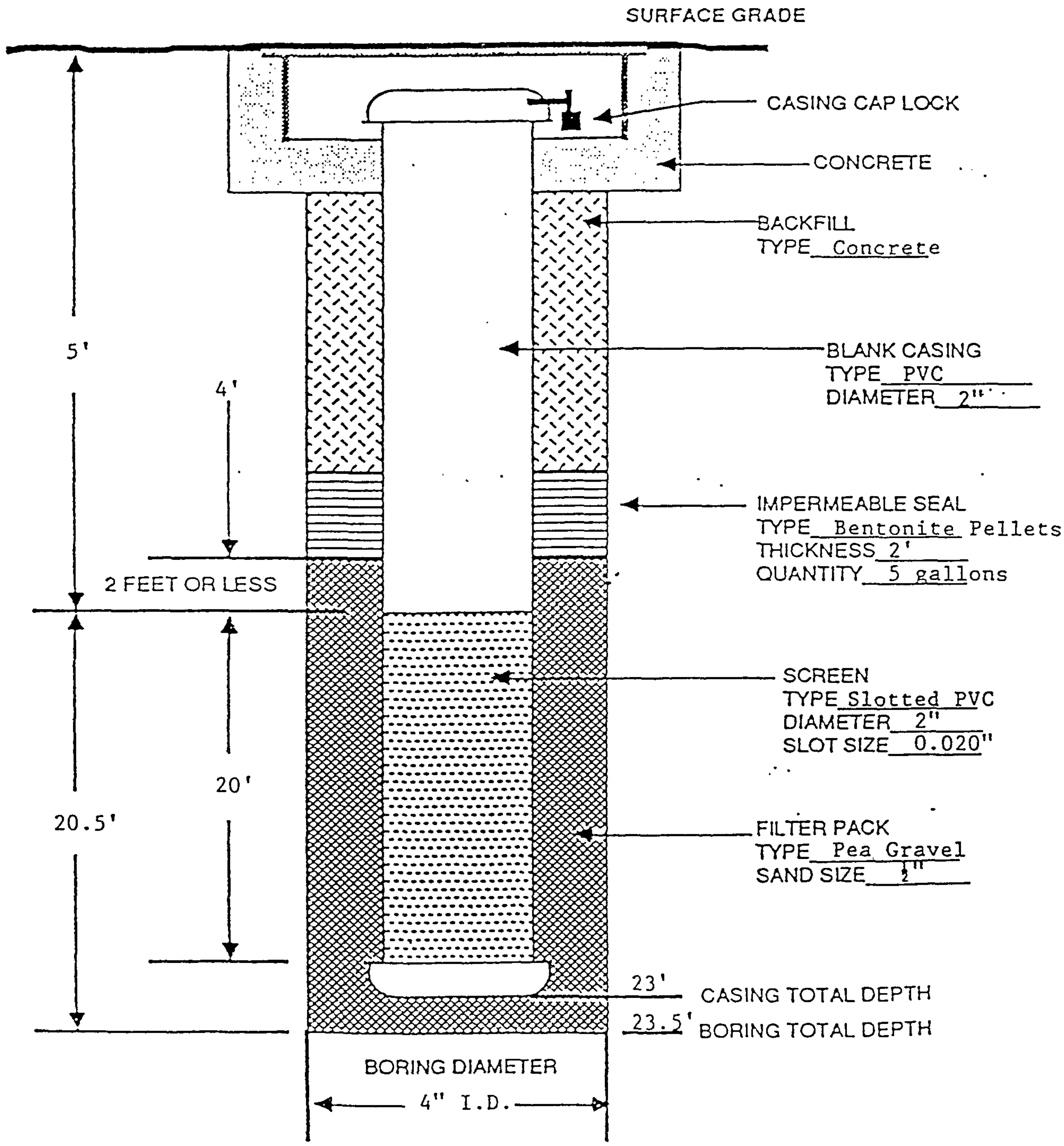
INSTALLATION DATE: 9/21/88

SURFACE ELEV: (FT ABOVE MSL) 167.26

TOP OF CASING: (FT ABOVE MSL)

SURVEYED WELL LOCATION: N-4094197.9 E-4270911.8

SITE MANAGER: R. Jenkins



ATTACHMENT C

SIMULATED DISTILLATION ANALYTICAL PROCEDURE

TRC

BCA STANDARD OPERATING PROCEDURE

SIMULATED DISTILLATION

A. Summary

This method is used to determine and characterize FID detectable hydrocarbons C_8 to C_{44} in aqueous, soil, sediment, or product samples by gas chromatography. The characterization of heavier fuels such as diesel, naphtha, jet fuels and crudes may be achieved by this method.

The sample is extracted with pentane and then injected into a gas chromatograph equipped with a megabore column, split injector and flame ionization detector.

B. Safety

1. Analyst should use gloves when handling samples or standards.

2. Safety glasses should be worn.

3. Standards and samples should be prepped in the hood.

C. Apparatus

1. HP 5890 (or equivalent) gas chromatograph equipped with:

   a. Flame Ionization Detector
   b. HP 7673A Autosampler (or equivalent)
   c. Split Injector.

2. Column (Restek 6 meter x 0.53 mm ID sicosteel clad column, 0.1 um thickness or equivalent).

3. Autosampler vials - 2 mL.

4. Graduated pipets - 25 mL disposable.

5. Hamilton syringes - 50 uL, 100 uL, 1000 uL.

6. Repipetor - 10 mL.

7. Top loading balance.

8. Septa must have a maximum operating temperature of 350°C or higher. The septa will need to be changed often -

approximately after every 50-75 injections or 5 days. Supelco Thermogreen LB-2 septa are recommended.

9. Injector liner with glass wool or equivalent. Several should be kept in stock and changed every 3-6 months depending on sample volume. A split liner with half of the glass wool removed is recommended.

D. Reagents

1. Diesel spike solution: 0.100 g neat into 10 mL CS_2 for a 10,000 ppm solution.

2. Carbon disulfide - Aldrich glass distilled HPLC grade or equivalent.

3. 1,3-Dichlorobenzene surrogate: 0.100 g neat into 10 mL CS_2 for 10,000 ppm solution.

4. Calcium chloride, 0.1 M: 1.11 g 4 to 30 mesh or powdered $CaCl_2$ into 1 L water.

6. Calibration standards: individual carbons C_8,C_{10}, C_{12}, C_{14}, C_{16}, C_{18}, C_{20}, C_{24}, C_{28}, C_{32}, C_{36}, C_{40}, and C_{44} should.be ordered neat. Prepare a working standard of 4000 ppm of C_8-C_{40} and 800 ppm pf C_{44} standard by weighing out 0.1g of C_8-C_{40} and 0.025g of C_{44} into a 25 ml volumetric flask. Dilute to mark with CS_2. Calibration levels should be 50, 100, 200 and 300 ppm for C_8 to C_{40} and 12.5, 25 and 75 ppm for C_{44}.

5. Calibration check standard, 100 ppm: From the 4000 ppm solution, prepare a 100 ppm C_8-C_{40} and 25 ppm C_{44} in CS_2 by placing 25 uL of the 4000 ppm solution in 1 mL CS_2.

E. Procedure

1. Notebook Preparation

   a. Enter the date, the instrument number and the analyst's initials in the header.

   b. Prepare columns for log number, sample description, client name, sample weight, final volume and comments.

   c. Prepare the runlog by entering the date and analyst's initials in the header. Enter the log number of each sample to be run, the dilution (if any) and the data file name (the chromatogram number) in the appropriate columns of the run log.

2. Soil Preparation

   a. Tare a 40 mL vial in the toploading balance.

b. Open the core and discard the top 2 inches of soil.

c. Weigh 10 g of soil into the vial.

d. Record the sample weight in the prep book.

e. For matrix spikes, weigh out additional portions of sample and add 100 uL of a 10,000 ppm diesel solution. This will give a concentration of 1000 ppm.

f. For LCS, transfer 10 mL of CS_2 to an empty vial and add 1 mL of 10,000 ppm diesel.

g. For a method blank, transfer 10 mL of CS_2 to an empty vial.

h. Add 100 uL of surrogate to all samples including blank, spikes and LCS.

i. Add 2 mL of $CaCl_2$ to all soil samples, spikes and blank.

j. Add 10 mL of CS_2 to all samples and spikes.

k. Shake vigorously for two minutes.

3. Aqueous Sample Preparation

a. Pipet 25 mL of sample into a 40 mL vial. Sample should be taken from vials with no headspace.

b. For matrix spikes, pipet additional portions of sample into 40 mL vials. Add 100 uL of the 10,000 ppm diesel.

c. For the LCS, add 10 mL CS_2 to an empty vial. Add 100 uL of 10,000 ppm diesel solution.

d. For a method blank, transfer 10 mL of CS_2 to an empty vial.

e. Add 100 uL of surrogate to all spikes, blank, LCS, and samples.

f. Add 10 mL of CS_2 to all samples and spikes.

g. Shake vigorously for two minutes.

4. Sample Analysis

a. A CS_2 blank should be run to check for instrument contamination.

b. Initially calibrate the instrument by injecting 3 calibration standards (section D.6) for the individual carbons. The diesel standards should be run at 500, 1000 and 3000 ppm. The correlation coefficient should be at least 0.980.

c. Run the calibration check standard of C_8 to C_{40} and C C_{44} at 25 ppm mix at 100 ppm.

d. If the calibration check meets the criteria in section F, load the autosampler with method blank, samples, spike, duplicate spike, and LCS.

e. A pentane wash should be run after any sample where the pentane has turned dark or yellow to help prevent contamination from carryover.

5. Instrument Conditions

   a. Oven temperature
      Initial - 40°C
      Initial Hold - 5 minutes
      Rate - 20°C/minute
      Intermediate Temperature - 320°C
      Intermediate Hold - 6 minutes
      Final Temperature - 380°C
      Final Hold - 0 minutes
   Detector Temperature - 330°C
   Injector Temperature - 320°C

6. Autosampler Conditions

   Injection time - 0.02 minutes
   Injection volume - 1 uL
   Split flow - 30 mL/minute
   He:8 mL/minute
   He:30 mL/minute
   Air:350 mL/minute
   N_2:30 mL/minute

F. <u>Quality Control</u>

1. The calibration curve should have a correlation coefficient of at least 0.980.

2. The concentration of the calibration check must be within 25% of the expected value. If not, rerun the calibration check.

3. A matrix spike, matrix spike duplicate and LCS must be run every batch.

4. The LCS recovery should fall between the in-house determined control limits.

5. The percent recovery of the matrix spike should fall within in-house determined control limits. If not, check the LCS. If the LCS is within the control limits, the results can be reported.

6. A reagent (method) blank must be run with each batch.

G. Calculations and Data Review

Individual carbons:

Example: C_8-Add up the area between the retention times for C_8 to C_{10}. Include areas exactly on C_8 and up to but not including C_{10}.

Take this area and multiply by the response factor. This will equal your ppm amount for C_8. Follow this procedure for carbons C_8, C_{10}, C_{12}, C_{14}, C_{16}, C_{18}, C_{20}, C_{24}, C_{28}, C_{32}, C_{36}, C_{40}, and C_{44}.

Total fuels:

When requested by a client simulated distillation can be calculated against a regular fuel calibration.

Example:

Total area (minus surrogate) times response factor. The response factor can be from a diesel, oil, or other fuel calibration.

$$\text{Response Factor} = \frac{\text{Concentration of Standard}}{\text{Area Count of Standard}}$$

$$\text{Concentration of Aqueous (mg/L)} = \frac{As \times RF \times Ve}{Vs}$$

$$\text{Concentration Soil (mg/Kg)} = \frac{As \times RF \times Ve}{Ws}$$

where:

As = Area count of the sample
RF = Response factor
Ve = Volume of the methylene chloride extract
Vs = Volume of the aqueous sample
Ws = Weight of the soil sample

Carbon range:

Carbon range is determined by comparing with the retention time of Carbons C_8, C_{10}, C_{12}, C_{14}, C_{16}, C_{18}, C_{20}, C_{24}, C_{28}, C_{32}, C_{36}, C_{40}, C_{44}.

Characterization:

Characterization is done by matching the pattern with various types of fuels such as diesel, jet fuel, and motor oil.

H. Interferences

1. Any non-fuel compound which responds to FID detector will interfere with fuel analysis.

I. Troubleshooting

1. Low spike recovery.

   Check the surrogate recovery. If the surrogate recovery is also low, check for leaks and re-run the sample.

2. Excessive cross-contamination.

   a. Bake column at 350°C for at least one hour and then run several pentane washes.

   b. Replace the glass insert and cut the column at the injector end.

M. References

1. SOP Jones Environmental

2. ASTM Method 2887

Reviewed and approved
L. Geddes 03/11/96
Issued OKG 3/11/96

EPA/WDIG
CORRESPONDENCE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

October 21, 1997

Ian Webster, Ph.D.
WDIG Project Coordinator
376 S. Valencia
Brea, California 92621

Subject: Installation of Ventilation System and Liquids Removal Test - Waste Disposal, Inc. Superfund Site

Dear Mr. Webster:

Last week on October 15-16, 1997, the Waste Disposal, Inc. Group (WDIG) collected and removed without approval from the U.S. Environmental Protection Agency (EPA) critical information related to the liquids in VW-09 (vapor well) at the Waste Disposal, Inc. (WDI) Superfund site. The field data collected are requested immediately by EPA. Submit to EPA by Friday, October 24, 1997, the following items:

1. Copies of raw field notes prepared in association with the evacuation of VW-09.
2. Regarding evacuation of VW-09, provide the following additional data:
    a. Volume of liquids extracted from VW-09 (e.g., number of gallons)
    b. Number of drums/barrels on-site containing extracted liquids;
    c. Duration of extraction (e.g., hours) of liquids from VW-09;
    d. Rate of recovery (e.g., feet per minute) of liquids in VW-09 ;
    e. Photo Ionization Detector (PID) or Flame Ionization Detector (FID) air monitoring data;
    f. Copy of chain of custody forms for any samples sent for analysis;
    g. Copies of any preliminary analytical results, if available; and
    h. Extraction equipment used to evacuate VW-09 (e.g., size and type of pump).

Also submit to EPA by October 24, 1997, the following geo-probe data:

1. Copies of raw field notes associated with geo-probe data collected in Area 5; and
2. Copies of handwritten boring logs.

In order to more fully characterize the liquids identified in the reservoir, in addition to the tasks covered in EPA's October 16, 1997 letter, EPA also is directing the WDIG to conduct a liquids recovery test in November 1997. Submit to EPA by Friday, November 7, 1997, a proposal for installing a 5-6" extraction (recovery) well with a minimum of 5 monitoring points to monitor the effectiveness (e.g., radius of influence, drawdown, removal rate, product variability with time) of the recovery well test. The recovery test proposal shall include a protocol for sampling and analyzing the liquids in VW-09 and other new and existing wells located in the reservoir, with agency oversight.

On October 9, 1997, the WDIG informed EPA verbally that a soil vapor extraction (SVE) system may be infeasible for removing subsurface gases in the vicinity of Area 5. At this time, without EPA review and analysis of the data, such conclusions are premature. The WDIG should complete permeability testing on the soils collected in the immediate vicinity of the business (9843 Greenleaf Avenue) located in Area 5 and submit the results to EPA by Wednesday, October 29, 1997.

In the interim, until further definitive data is collected and analyzed, under Section IX and Section X of EPA's Amended Administrative Order, the WDIG must proceed to ventilate and monitor the indoor air quality of the business at 9843 Greenleaf Avenue. Therefore, submit to EPA by Monday, November 10, 1997 a plan for ventilating the building. The ventilation system shall be installed by the WDIG prior to Wednesday, November 26, 1997.

In January 1998, the WDIG shall commence quarterly indoor air monitoring of the building, consistent with the monitoring procedures under EPA's Subsurface Gas Contingency Plan. Therefore, appendices or revised sections of the Field Sampling and Analysis Plan (FSAP), the Quality Assurance Project Plan (QAPP), and the Comprehensive Subsurface Gas Quarterly Monitoring Plan covering this indoor air monitoring must be submitted to EPA for review and approval by November 15, 1997.

If you have any questions or need any additional information, please give me a call at (415) 744-2361.

Sincerely,

Andria Benner
Remedial Project Manager

cc:
Pat Hotra, SCAQMD
Neal Navarro, Army Corps of Engineers
Andy Lazzaretto, City of Santa Fe Springs
Virginia Maloles, LA County DOHS
Marilyn Underwood, Ph.D., CADHS
Roberto Puga, TRC/ESI
Kathy Steuer, Esq., EPA, ORC
Darryl Petker, CIWMB
Shawn Haddad, DTSC
Bill Nelson, ATSDR
Stan Smucker, Ph.D., EPA
Keith Elliott, RWQCB
John Wondolleck, CDM Federal
Shelby Moore, Esq., WDIG

WASTE DISPOSAL INC.
SUPERFUND SITE
Project Coordinator

November 7, 1997 | Project No. 94-256

Ms. Andria Benner
U.S. Environmental Protection Agency
75 Hawthorne Street, #H-7-2
San Francisco, California 94105-3901

<u>Transmittal</u>
<u>Technical Memoranda No. 6</u>
<u>Waste Disposal, Inc. Superfund Site</u>
<u>Santa Fe Springs, California</u>

Dear Ms. Benner::

Enclosed please find two (2) copies of Technical Memoranda (TM) No. 6 - Reservoir Liquids Recovery Test. This TM was prepared in response to EPA's request in their October 21, 1997 letter to the WDIG project coordinator.

If you have any questions or comments, please call me at (714) 577-2955.

Sincerely,

for

Ian Webster
WDIG Project Coordinator

IW/MG/dh
Enclosures

cc: James Barton, COE
Keith Elliott, RWQCB
Shawn Haddad, DTSC
Pat Hotra, SCAQMD
Andy Lazzaretto, City of Santa Fe Springs
Virginia Maloles, LA Country DOHS
Neal Navarro, COE
Shelby Moore, Esq., WDIG
Bill Nelson, ATSDR
Darryl Petker, CIWMB
Roberto Puga, TRC
Stan Smucker, Ph.D., EPA
Kathy Steuer, ESQ.,EPA, ORC
Dave Taylor, EPA
Marilyn Underwood, Ph.D., CDM Federal
John Wondolleck, CDM Federal
WDIG Members

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

November 17, 1997

Ian Webster, Ph.D.
WDIG Project Coordinator
376 S. Valencia
Brea, California 92621

Subject: Comments on Technical Memorandum No.6 - Reservoir Liquids Recovery Test - Waste Disposal, Inc. Superfund Site

Dear Mr. Webster:

The purpose of this letter is to transmit comments from the U.S. Environmental Protection Agency (EPA) on the Technical Memorandum No. 6, Reservoir Liquids Recovery Test, dated November 6, 1997. In order to expedite the approval of this plan, the Waste Disposal, Inc. (WDIG) shall submit a response to these comments and incorporate changes into a revised technical memorandum by Monday, November 24, 1997. EPA would like to review and approve this test as soon as possible, in order for the WDIG to conduct this test in December 1997.

1. Section 1.0, Page 1, #2, Bullet 6. Clarify text that all 5 wells will be sampled for liquids and soil gas. Also, edit Table 2 to indicate that all wells will be sampled for liquids and soil gas.
2. Section 3.0, Page 2, #1. The text states that results of both the sampling activity and chemical analyses for Vapor Well (VW-09) are included in Attachment A. The chemical analyses are not included (only the Field Activity Report and the Chain of Custody form). Provide the results in Attachment A.
3. Section 3.0, Page 2, #3. After geoprobe work is completed to identify the bottom of the reservoir, WDIG shall discuss the findings with EPA or its representatives prior to the well installation.
4. Section 3, page 2, #4 and #5. Recommend using explosion proof pumps and other instruments. Recommend using product pumps (e.g., pneumatic pump), rather than a submersible electric pump.
5. Section 3.0, page 2, #4, Table 1, Materials and Equipment Specifications. Edit the table to include the use of a flow meter with totalizer to record the volume of liquids recovered. Also, include in the table the use of a FID, PID and a landfill gas analyzer for measuring methane, non-methane hydrocarbons, and volatile organic compounds (VOCs) at the well opening.
6. Section 3.0, page 2, #8, Table 2, Liquids and Soil Gas Sampling Schedule and Protocols, and Attachment C, Simulated Distillation Analytical Procedures. Water samples should be analyzed unfiltered. The analytical procedure in Attachment C is acceptable for oil-phase liquids.

7. Section 3.0, page 2, #8, Table 2, Liquids and Soil Gas Sampling Schedule and Protocols. More analyses are needed for design purposes, including: oil and grease, total petroleum hydrocarbons (TPH) by Method 418.1, BTU of product, total suspended solids, total dissolved solids, alkalinity, pH, hardness, sulfur content, bicarbonate alkalinity, and bacterial counts. Methane soil gas sampling also should be conducted according to South Coast Air Quality Management District (SCAQMD) protocols.
8. Section 3.0, page 2, #9. Include a site plan identifying the location of the other wells to be sampled in the reservoir. Recommend all wells in the reservoir be sampled. Edit Table 2 to indicate what wells will be sampled and at what frequency. Describe the test to be performed at these wells. Clarify what is meant by "at start of test" and "after bailing."
9. Figure 2, Proposed Extraction Well. Recommend installing a 2-3 foot sump at the bottom of the screen to collect sediments in the extraction well.
10. Figure 2, Proposed Extraction Well, and Figure 3, Proposed Liquids Monitoring Probes. Recommend a tremie pipe be used to install the bentonite cement grout, instead of bentonite pellets. To install the surface seal, a 2-foot bentonite grout interval covered by a 1-foot cement interval is suggested, rather than a 3-foot interval of bentonite grout.
11. Figure 2, Proposed Extraction Well, and Figure 3, Proposed Liquids Monitoring Probes. Recommend using 2-foot interval of #30 Monterey Sand below the seal, rather than a 1-foot interval.

If you have any questions or need any additional information, please give me a call at (415) 744-2361.

Sincerely,

Andria Benner
Remedial Project Manager

cc:
Pat Hotra, SCAQMD
Neal Navarro, Army Corps of Engineers
Andy Lazzaretto, City of Santa Fe Springs
Virginia Maloles, LA County DOHS
Marilyn Underwood, Ph.D., CADHS
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Stan Smucker, Ph.D., EPA
Keith Elliott, RWQCB
John Wondolleck, CDM Federal
Shelby Moore, Esq., WDIG

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

November 21, 1997

OFFICE OF THE
REGIONAL ADMINISTRATOR

Ian Webster, Ph.D.
WDIG Project Coordinator
376 S. Valencia
Brea, California 92621

Subject: Comments on Well Construction Proposals for Liquids Extraction Well and Soil Vapor Monitoring Wells - Waste Disposal, Inc. Superfund Site

Dear Mr. Webster:

The purpose of this letter is to transmit comments from the U.S. Environmental Protection Agency (EPA) on the proposed construction of the liquids extraction well and the soil vapor monitoring wells for the Waste Disposal, Inc. (WDI) Superfund site. The WDIG shall submit to EPA by Wednesday, November 26, 1997, revised well construction figures addressing EPA's comments, so that EPA can approve the well specifications and plans in time for installation to begin the week of December 8, 1997. The revised figures and text should be incorporated into Technical Memorandum #6 (Liquids Recovery Test) and the Comprehensive Subsurface Gas Quarterly Monitoring Plan, Field Sampling and Analysis Plan (FSAP), and Quality Assurance Project Plan (QAPP), as appropriate.

Liquids Extraction Well:

1. Centralizers should be used to ensure placement in center of borehole.
2. Wire-wrapped (stainless steel) is recommended; however, at a minimum 0.25 slot size should be used.
3. Design should include provisions for installing utilities, so that if needed, well can easily be converted to a permanent extraction well.
4. A 1-foot sump should be installed at the bottom of the extraction well.

Soil Gas Monitoring Wells:

1. Continuous core borings will be drilled at soil gas monitoring well location to provide information about the stratigraphy prior to the well installation in order to determine the number of sampling intervals required at each location. An EPA field representative will be available to review the core borings in the field so that decisions can be made on the number and placement of the soil gas monitoring wells.
2. EPA will allow two screen intervals only in locations where the site stratigraphy indicates there are only two formation intervals (e.g., fill material overlying native soil). For example, Vapor Well (VW)-36, VW-37, and VW-38 appear to require three sampling intervals rather than the two proposed. A final decision will be made in the field in consultation with the EPA field representative.

3. Screens should be no longer that 5 feet; actually size of screen length will be cut in field to match the corresponding soil or sludge interval, as agreed to by the WDIG and EPA field representatives.
4. 40 slot size should be used; diameter of wells should be 1".
5. 1/4" pea gravel should be used to match screen size.
6. A 1-2-foot sump should be located at the bottom of each well placed in the sump/sludge material to collect potential liquids.
7. Neat cement should be used, rather than a bentonite mixed product for sealing the wells.
8. An air test should be conducted after completion of cluster well installations to ensure integrity of seals, or separate boreholes should be drilled.

If you have any questions or need any additional information, please give me a call at (415) 744-2361.

Sincerely,

Andria Benner
Remedial Project Manager

cc: Pat Hotra, SCAQMD
Neal Navarro, Army Corps of Engineers
Andy Lazzaretto, City of Santa Fe Springs
Virginia Maloles, LA County DOHS
Marilyn Underwood, Ph.D., CADHS
Roberto Puga, TRC/ESI
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Shawn Haddad, DTSC
Bill Nelson, ATSDR
Stan Smucker, Ph.D., EPA
Keith Elliott, RWQCB
John Wondolleck, CDM Federal
Shelby Moore, Esq., WDIG

WASTE DISPOSAL INC.
SUPERFUND SITE
Project Coordinator

November 25, 1997 | Project No. 94-256

Ms. Andria Benner
U.S. Environmental Protection Agency
75 Hawthorne Street, No. H-7-2
San Francisco, California 94105-3901

Transmittal
Technical Memorandum No. 6 (Revision 1.0)
and Technical Memorandum No. 7
Waste Disposal, Inc. Superfund Site
Santa Fe Springs, California

Dear Ms. Benner:

Enclosed please find five (5) copies of Technical Memorandum (TM) No. 6 (Revision 1.0) - Reservoir Liquids Recovery Test and TM No. 7 - Vapor Well Construction Details. The revised TM No. 6 and TM No. 7 were prepared in response to EPA's requests in their November 17 and 21, 1997 letters to the WDIG project coordinator.

Attached are Table 1 - Response to November 17 and 21, 1997 EPA Comments to TM No. 6 and Table 2 - Response to November 21, 1997 EPA Comments to WDIG November 19, 1997 Soil Gas Monitoring Wells Presentation.

If you have any questions or comments, please call me at (562) 692-4535.

Sincerely,

Ian Webster pp

Ian A. Webster
WDIG Project Coordinator

IAW/JB:ks
Enclosures

cc: James Barton, COE
Keith Elliott, RWQCB
Shawn Haddad, DTSC
Pat Hotra, SCAQMD
Andy Lazzaretto, City of Santa Fe Springs
Virginia Maloles, LA County DOHS
Neal Navarro, COE
Shelby Moore, Esq., WDIG
Bill Nelson, ATSDR
Darryl Petker, CIWMB
Roberto Puga, TRC
Stan Smucker, Ph.D., EPA
Kathy Steuer, Esq., EPA, ORC
Dave Taylor, EPA
Marilyn Underwood, Ph.D., CDM Federal
John Wondolleck, CDM Federal
WDIG Members

TABLE 1

RESPONSES TO NOVEMBER 17 AND 21, 1997 EPA COMMENTS TO TECHNICAL MEMORANDUM NO. 6 RESERVOIR LIQUIDS RECOVERY TEST WASTE DISPOSAL, INC. SUPERFUND SITE

EPA COMMENTS	RESPONSE TO COMMENTS
November 17, 1997 Comments:	
1. Section 1.0, Page 1, #2, Bullet 6. Clarify text that all 5 wells will be sampled for liquids and soil gas. Also, edit Table 2 to indicate that all wells will be sampled for liquids and soil gas.	1. The text has been clarified to indicate that the five wells will be sampled for liquids and soil gas. Table 2 now clearly shows that liquid and soil gas samples will be collected from all five wells.
2. Section 3.0, Page 2, #1. The text states that results of both the sampling activity and chemical analyses for Vapor Well (VW-09) are included in Attachment A. The chemical analyses are not included (only the Field Activity Report and the Chain of Custody form). Provide the results in Attachment A.	1. Analytical results for Vapor Well VW-09 are now included in Attachment A.
3. Section 3.0, Page 2, #3. After geoprobe work is completed to identify the bottom of the reservoir, WDIG shall discuss the findings with EPA or its representatives prior to the well installation.	1. EPA's ERT personnel have recently completed geoprobe work in the test area. This data will be reviewed prior to well/probe installation.
4. Section 3.0, Page 2, #4 and #5. Recommend using explosion proof pumps and other instruments. Recommend using product pumps (e.g., pneumatic pump), rather than a submersible electric pump.	1. An explosion proof skimmer pump and pneumatic pump will be used during the liquids recovery testing (see Table 1).
5. Section 3.0, Page 2, #4, Table 1, Materials and Equipment Specifications. Edit the table to include the use of a flow meter with totalizer to record the volume of liquids recovered. Also, include in the table the use of a FID, PID and a landfill gas analyzer for measuring methane, non-methane hydrocarbons, and volatile organic compounds (VOCs) at the well opening.	1. Table 1 provides a complete list of Materials and Equipment Specifications required for performing the liquids recovery test.
6. Section 3.0, Page 2, #8, Table 2, Liquids and Soil Gas Sampling Schedule and Protocols, and Attachment C, Simulated Distillation Analytical Procedures. Water samples should be analyzed unfiltered. The analytical procedure in Attachment C is acceptable for oil-phase liquids.	1. Table 2 notes that aqueous samples will be unfiltered.
7. Section 3.0, Page 2, #8, Table 2, Liquids and Soil Gas Sampling Schedule and Protocols. More analyses are needed for design purposes, including: oil and grease, total petroleum hydrocarbons (TPH) by Method 418.1, BTU of product, total suspended solids, total dissolved solids, alkalinity, pH, hardness, sulfur content, bicarbonate alkalinity, and bacterial counts. Methane soil gas sampling also should be conducted according to South Coast Air Quality Management District (SCAQMD) protocols.	1. The additional chemical analysis has been included in Table 3. 2. Soil gas sampling and analyses will be performed per procedures and methods described in the RD Investigative Activities Workplan (Rev. 2.0) FSAP and QAPP.

TABLE 1

RESPONSES TO NOVEMBER 17 AND 21, 1997
EPA COMMENTS TO TECHNICAL MEMORANDUM NO. 6
RESERVOIR LIQUIDS RECOVERY TEST
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

EPA COMMENTS	RESPONSE TO COMMENTS
November 17, 1997 Comments: (Continued)	
8. Section 3.0, Page 2, #9. Include a site plan identifying the location of the other wells to be sampled in the reservoir. Recommend all wells in the reservoir be sampled. Edit Table 2 to indicate what wells will be sampled and at what frequency. Described the test to be performed at these wells. Clarify what is meant by "at start of test" and "after bailing."	1. Currently, the WDIG does not have a plan view showing the location of the other wells in the reservoir. The WDIG is committing to sampling these other reservoir wells. Prior to beginning this work, the WDIG and EPA will concur as to the locations of these wells. 2. Table 2 now includes the sampling frequency and explanatory footnotes for the requested phrases.
9. Figure 2, Proposed Extraction Well. Recommend installing a 2-3 foot sump at the bottom of the screen to collect sediments in the extraction well.	1. Figures 1 and 2 show the revised well construction details per the comments.
10. Figure 2, Proposed Extraction Well, and Figure 3, Proposed Liquids Monitoring Probes. Recommend a tremie pipe be used to install the bentonite cement grout, instead of bentonite pellets. To install the surface seal, a 2-foot bentonite grout, instead of bentonite pellets. To install the surface seal, a 2-foot bentonite grout interval covered by a 1-foot cement interval is suggested, rather than a 3-foot interval of bentonite grout.	
11. Figure 2, Proposed Extraction Well, and Figure 3, Proposed Liquids Monitoring Probes. Recommend using 2-foot interval of #30 Monterey Sand below the seal, rather than a 1-foot interval.	
November 21, 1997 Comments:	
1. Centralizers should be used to ensure placement in center of borehole.	1. Figures 1 and 2 show the revised well construction details per the comments.
2. Wire-wrapped (stainless steel) is recommended; however, at a minimum 0.25 slot size should be used.	
3. Design should include provisions for installing utilities, so that if needed, well can easily be converted to a permanent extraction well.	
4. A 1-foot sump should be installed at the bottom of the extraction well.	

TRC

TABLE 2

RESPONSE TO NOVEMBER 21, 1997 EPA COMMENTS TO WDIG NOVEMBER 19, 1997 SOIL GAS MONITORING WELLS PRESENTATION WASTE DISPOSAL, INC. SUPERFUND SITE

EPA COMMENTS	RESPONSE TO COMMENTS
1. Continuous core borings will be drilled at soil gas monitoring well location to provide information about the stratigraphy prior to the well installation in order to determine the number of sampling intervals required at each location. An EPA field representative will be available to review the core borings in the field so that decisions can be made on the number and placement of the soil gas monitoring wells.	1. Comment is noted and is incorporated into TM No. 7 (Section 2, Paragraph 2).
2. EPA will allow two screen intervals only in locations where the site stratigraphy indicates there are only two formation intervals (e.g., fill material overlying native soil). For example, Vapor Well (VW)-36, VW-37 and VW-38 appear to require three sampling intervals rather than the two proposed. A final decision will be made in the field in consultation with the EPA field representative.	1. Comment is noted.
3. Screens should be no longer than 5 feet; actually size of screen length will be cut in field to match the corresponding soil or sludge interval, as agreed to by the WDIG and EPA field representatives.	1. Comment is incorporated into TM No. 7 (Figure 2, 3 and 4, Table 2).
4. 40 slot size should be used; diameter of wells should be 1 inches.	1. Comment is incorporated into TM No. 7 (Figure 5).
5. 1/4-inch pea gravel should be used to match screen size.	1. Comment is incorporated into TM No. 7 (Figure 5).
6. A 1-2-foot sump should be located at the bottom of each well placed in the sump/sludge material to collect potential liquids.	1. Comment is incorporated into TM No. 7 (Figure 5).
7. Neat cement should be used, rather than a bentonite mixed product for sealing the wells.	1. Comment is incorporated into TM No. 7 (Figure 5).
8. An air test should be conducted after completion of cluster well installations to ensure integrity of seals, or separate boreholes should be drilled.	1. Comment is incorporated into TM No. 7 (Section 3.1, Paragraph 6).

94-256 (11/25/97/ks)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

December 3, 1997

Ian Webster, Ph.D.
WDIG Project Coordinator
376 S. Valencia
Brea, California 92621

Subject: Approval of Technical Memoranda No. 6 (Reservoir Liquids Recovery Test) and No. 7 (Vapor Well Construction Details) - WDI Superfund Site

Dear Mr. Webster:

As discussed verbally, the U.S. Environmental Protection Agency (EPA) approves Technical Memorandum (TM) No. 6 (Reservoir Liquids Recovery Test) and TM No. 7 (Vapor Well Construction Details) submitted to EPA on November 25, 1997, with the following conditions:

1. The work to be performed (e.g., the installation of the soil vapor monitoring wells and the reservoir liquids recovery test wells) will commence on Monday, December 8.
2. The EPA concurs with the WDIG's request to delay the drilling if determined necessary because of rainfall. The WDIG shall keep EPA informed on a daily basis if the drilling is delayed.
3. T.M. No. 7: As a matter of clarification on the WDIG's response #2 ("Comment is noted.") on Table 2, the WDIG shall install three screen intervals for sampling if determined necessary (based on the stratigraphy) by EPA's field representative.
4. TM No. 6: Attachment A, Results of VW-09 Sampling (VOC Analytical Laboratories, Inc.) is missing data or presents data contrary to the Standard Operating Procedure (SOP). Please clarify and provide missing data.
   a. VOC Analytical Report, Page 1: The soil vapor results (Methane and TO-14) are not reported.
   b. VOC Analytical Report, Page 15: Attachment C, Simulated Distillation Analytical Procedure, states that individual carbons (C_8 through C_{44}) would be analyzed. Only C_{10} through C_{44} are reported on page 15.
   c. VOC Analytical Report: Volatile organic compound (VOC) data for non-aqueous liquids (product) are not included in report.

EPA's Environmental Response Team (ERT) may provide some additional comments on TM No. 6 and TM No. 7. Any additional comments will be provided to the WDIG on Thursday, December 4, 1997.

If you have any questions or need any additional information, please give me a call at (415) 744-2361.

Sincerely,

Andria Benner
Remedial Project Manager

cc: Pat Hotra, SCAQMD
Neal Navarro, Army Corps of Engineers
Andy Lazzaretto, City of Santa Fe Springs
Virginia Maloles, LA County DOHS
Marilyn Underwood, Ph.D., CADHS
Roberto Puga, TRC/ESI
Kathy Steuer, Esq., EPA, ORC
Darryl Petker, CIWMB
Shawn Haddad, DTSC
Bill Nelson, ATSDR
Stan Smucker, Ph.D., EPA
Keith Elliott, RWQCB
John Wondolleck, CDM Federal
Shelby Moore, Esq., WDIG

WASTE DISPOSAL INC.
SUPERFUND SITE
Project Coordinator

July 10, 1998 Project No. 94-256

Ms. Andria Benner
U.S. Environmental Protection Agency
75 Hawthorne Street, No. H-7-2
San Francisco, California 94105-3901

Additional Ground Water Well Installations
Waste Disposal, Inc. Superfund Site

Dear Ms. Benner:

As we discussed during our Technical Exchange Meeting on June 24, 1998 and in response to the requests in your June 30, 1998 letter, this letter provides the rationale, locations and installation procedures for two additional ground water monitoring wells at the site.

The rationale and location for the two additional wells is as follows:

- Well GW-32 (see Figure 1) is intended to monitor the deeper portion of the first aquifer underlying the site. As was presented by CDM Federal at the June 24, 1998 meeting, this upgradient location is desirable in order to detect the concentrations of volatile organic compounds (VOCs) in the ground water entering the site subsurface from off-site sources.
- Well GW-33 (see Figure 1) will be installed in two phases and is intended to monitor a portion of the site where there is a greater spacing of ground water monitoring wells. In the initial phase, a soil boring will be completed in the southern portion of Area 2 (Figure 1) in order to identify the vertical limits of fill soil, waste material and native material. There was some concern expressed at the Technical Exchange Meeting that the portion of the site being investigated by the soil boring may have a different waste characteristic, based on historical activities. If the soil boring indicates that the waste conditions are consistent with previous subsurface investigations, then a ground water monitoring well will be installed in Area 6 (Figure 1). The difference in locations is due to the desire to avoid the possibility of cross contamination of the ground water. If conditions prove to be different (e.g., should waste be found to extend to the water table), the location for Well GW-33 will be discussed with EPA prior to installation.

The wells will be installed according to approved procedures in the RD Investigative Activities Workplan (TRC, 1997). The most pertinent material from the Workplan, SOP D - Ground Water Monitoring Well Installation Activities, is attached. The construction details and dimensions for the wells are included in Figures 2 and 3.

It is anticipated that these activities will be completed during the week of July 20, 1998, such that the new wells can be included in the upcoming ground water monitoring round.

Given that established and approved procedures are to be used to install the additional wells, as well as the desire to include the wells in the upcoming monitoring round, it is anticipated that your approval could be granted expeditiously.

If you have any questions and comments, please contact me at (562) 692-4535 or via e-mail at pronavian@aol.com.

Sincerely,

Ian Webster /RP

Ian A. Webster
WDIG Project Coordinator

IAW/CS:ks

cc: Pat Hotra, SCAQMD
Neal Navarro, Army Corps of Engineers
Andy Lazzaretto, City of Santa Fe Springs
Virginia Maloles, LA County DOHS
Clement Walsh, CADHS
Roberto Puga, TRC
Cynthia Wetmore, EPA
Mark Filippini, EPA
Kathy Steuer, Esq., EPA, ORC
Tim Crist, CIWMB
Shawn Haddad, DTSC
Bill Nelson, ATSDR
Stan Smucker, Ph.D., EPA
Keith Elliott, RWQCB
John Wondolleck, CDM Federal
William Coakley, EPA ERT
Mike Finch, DTSC
Shelby Moore, Esq., WDIG

WASTE DISPOSAL INC.
SUPERFUND SITE
Project Coordinator

July 10, 1998 | Project No. 94-256

Ms. Andria Benner
U.S. Environmental Protection Agency
75 Hawthorne Street, No. H-7-2
San Francisco, California 94105-3901

Addendum – TM No. 6
Additional Extraction Wells and Pump Tests
Waste Disposal, Inc. Superfund Site

Dear Ms. Benner:

The purpose of this letter is to append a set of additional well installations and pump test activities to the Technical Memorandum (TM) No. 6 – Reservoir Liquids Testing, approved by EPA in December, 1997. As was discussed at our June 24, 1998 Technical Exchange Meeting, the WDIG has postulated that the mobile liquids in the reservoir are contained in the fill soil overlying the less permeable drilling mud waste materials. This hypothesis has very important implications concerning any remedial options for the reservoir liquids, as explained below.

The results of the TM No. 6 activities to date indicate that the liquids that were extracted during pump tests were being yielded by the overlying fill soils and not the underlying, relatively impermeable waste material. This implies that the volume of mobile liquids is confined to a fairly thin zone of fill soil. If this hypothesis is shown to be correct, remedial actions for the reservoir liquids could be initiated in the short term (i.e., before the formal Remedial Action phase) of the project. Therefore, the WDIG feels that the verification of this hypothesis is a critical path item and would like to proceed with field investigative activities as soon as possible.

The scope of the additional field investigative activities includes the following:

- Installation of two adjacent liquid extraction wells at a location in the reservoir to be determined in conjunction with EPA's planned reservoir boring investigation. The locations will be selected based on field observations of the EPA borings and after consensus between EPA's and WDIG's field representatives. The construction of the extraction wells will be the same as existing wells WDI-EX-1 and -2. Figures 1 and 2 show the anticipated completion dimensions of the new wells. The need for additional monitoring probes will be determined after the well locations are selected. Figure 3 shows the anticipated completion for the new probes. Precise dimension for the new probes will be determined once their location is selected.
- Pump cycle tests will be performed in the new extraction wells, with associated monitoring in the adjacent well(s) and probes. The cycle tests will be completed using the procedures employed last month for the pump cycle test at Well WDI-EX-2.

- Liquid samples will be collected from the new wells for chemical characterization, using the procedures and suite of analyses outlined in TM No. 6.
- A letter report will be prepared to document the findings of the additional activities.

It is anticipated that these activities will be performed at the end of EPA's reservoir boring investigation. The closest estimate at this time is on or about the last week in July, although we underscore WDIG's commitment to execute this work as soon as possible.

WDIG hopes that EPA concurs that the performance of these additional activities is of high importance to the project. Given that established and approved procedures are to be used, and that the objective of the activities is clear, we hope EPA will be able to expeditiously approve these activities.

If you have any questions and comments, please contact me at (562) 692-4535 or via e-mail at pronavian@aol.com.

Sincerely,

Ian Webster/rf

Ian A. Webster
WDIG Project Coordinator

IAW/CS:ks
Attachments

cc: Pat Hotra, SCAQMD
Neal Navarro, Army Corps of Engineers
Andy Lazzaretto, City of Santa Fe Springs
Virginia Maloles, LA County DOHS
Clement Walsh, CADHS
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Stan Smucker, Ph.D., EPA
Keith Elliott, RWQCB
John Wondolleck, CDM Federal
William Coakley, EPA ERT
Mike Finch, DTSC
Shelby Moore, Esq., WDIG

WASTE DISPOSAL INC.
SUPERFUND SITE
Project Coordinator

August 4, 1998 Project No. 94-256

Mr. Mark Filippini
U.S. Environmental Protection Agency
75 Hawthorne Street, No. H-7-2
San Francisco, California 94105-3901

Transmittal
Suggested Locations for
Additional TM No. 6 Activities
Waste Disposal, Inc. Superfund Site

Dear Mr. Filippini:

Pursuant to our discussions at the Technical Exchange Meeting held last Friday, July 31, 1998, enclosed please find Figure 1, showing the suggested locations for additional TM No. 6 activities. As per our July 10, 1998 letter to you, the additional TM No. 6 activities proposed include the following:

- Installation of two additional adjacent reservoir test wells. This well cluster will have one well screened in the overlying fill soil, and the other in the underlying waste material.
- Performance of liquids pump tests in the two distinct reservoir zones, i.e., the fill soil and waste material.

In addition to the above scope, another reservoir extraction well cluster has been added to the scope, based on discussions during the July 31, 1998 Technical Exchange Meetings.

The rationale for the two reservoir well cluster locations is as follows:

- Wells EX-3 and -4 will test liquid yields in an area where free product levels were measured at the ground surface. These measurements were conducted during the piezometer installation program completed by CDM Federal recently.
- Wells EX-5 and -6 will test liquid yields in an area where free product has been measured, and where existing wells and probes can provide an expanded monitoring network.

Each of the new well clusters will have monitoring probes installed at 10-, 20- and 40-foot distances from the wells. Figure 1 shows the locations of the probes. Figure 2 shows the probe construction diagram, which is identical to the construction of the TM No. 6 monitoring probes.

The planned start date for well and probe installations is August 10, 1998. As discussed, we anticipate your approval or comment this week.

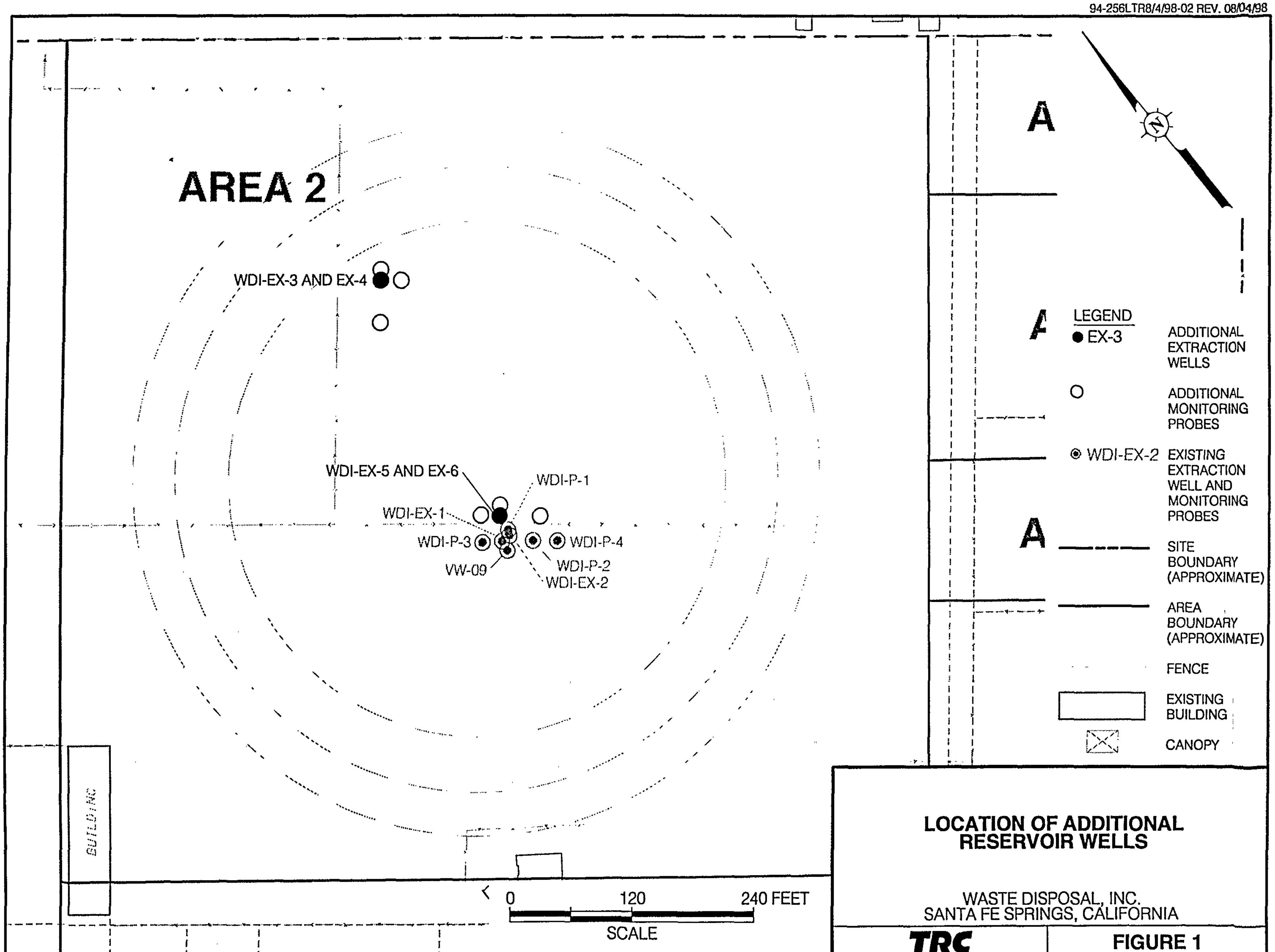
Sincerely,

Ian Webster /pp

Ian Webster
WDIG Project Coordinator

IW/MG:mc
Enclosure

cc: Andria Benner, EPA
Boone and Associates, for WDIG
Bill Coakley, EPA ERT
Tim Crist, CIWMB
Mike Finch, DTSC
Les La Fountain, NCI
Ed McGovern, WESTON
Roberta Puga, TRC
Mike Skinner, WDIG
Cynthia Wetmore, EPA
John Wondolleck, CDM Federal
Ken Woodruff, WESTON

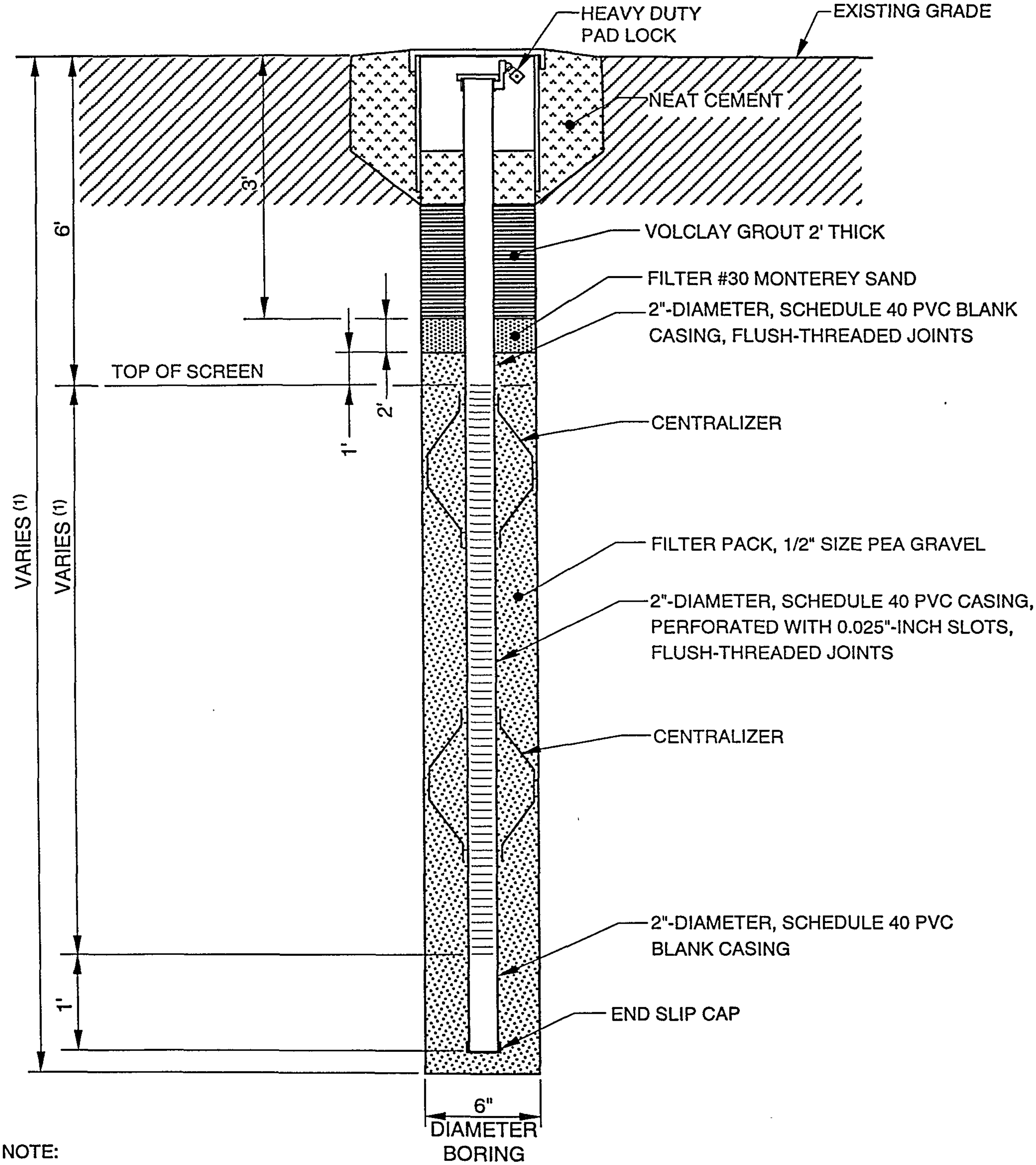


LOCATION OF ADDITIONAL RESERVOIR WELLS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 1



NOTE:

(1) FINAL DEPTH WILL BE DETERMINED BASED ON ENCOUNTERED SUBSURFACE. ONE PROBE WILL BE INSTALLED IN THE FILL SOIL AND ONE PROBE WILL BE INSTALLED IN THE WASTE MATERIAL.

(2) EACH PROBE WILL BE INSTALLED IN SEPARATE BOREHOLES.

(3) THE CASING WILL BE SUSPENDED DURING CONSTRUCTION TO MINIMIZE CASING CURVATURE.

TYPICAL CONSTRUCTION DETAILS FOR LIQUID MONITORING PROBES

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 2

RP
ES
AS
file

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

5 August 1998

To
Roberto
Puga

Ian Webster, Sc.D.
WDIG Project Coordinator
c/o Project Navigator, Ltd.
10530 Floral Drive
Whittier, California 90606

Subject: Approval of Proposed Locations for Additional Extraction Wells

Dear Ian:

Per our discussions at the Technical Meeting of Friday 31 July and your 4 August letter, this letter presents our approval of the locations of the proposed reservoir liquid test wells. In our meeting, and in the 4 August letter, WDIG proposed to locate two pairs of liquids recovery test wells at the A-7 and F-5 locations of the existing piezometer network. These piezometers were installed by CDM Federal last month. It is our understanding that the proposed wells will be used to evaluate the source of liquids found in the reservoir. The wells will be subjected to short- and long-term pump tests to determine formation response.

USEPA has discussed the proposed locations with representatives of the State DTSC, the Corp of Engineers, and CDM Federal. Based on our discussions, we would recommend that the deep wells of each of the two well pairs be installed directly in the annulus of the existing piezometers at A-7 and F-5. This recommendation is made due to the extreme heterogeneity of the material in the reservoir. The existing casings can be easily removed prior to reaming the existing borehole. To assist you in determining the exact field locations of the two piezometers, ERT will be available onsite.

We understand that the wells are scheduled to be installed the week of 10 August. EPA and the State look forward to the results of these tests. If you have any questions, please contact me at (415) 744-2395.

Sincerely,

Mark G. Filippini
Project Hydrogeologist

cc: Roberto Puga, TRC/ESI
Andria Benner, USEPA
Michael Finch, DTSC
David Becker, USACOE

2.0

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TECHNICAL MEMORANDUM NO. 7
WASTE DISPOSAL, INC. SUPERFUND SITE

SUBJECT: Vapor Well Construction Details

DATE: November 25, 1997

SUBMITTED TO: Andria Benner, U.S. EPA

PROJECT NO.: 94-256

SUBMITTED BY: Ian Webster, WDIG Project Coordinator

cc:

James Barton, COE
Keith Elliott, RWQCB
Shawn Haddad, DTSC
Pat Hotra, SCAQMD
Andy Lazzaretto, City of Santa Fe Springs
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Stan Smucker, Ph.D., EPA
Kathy Steuer, Esq., EPA, ORC
Dave Taylor, EPA
Marilyn Underwood, Ph.D., CADHS
John Wondolleck, CDM Federal
WDIG Members

1.0 DESCRIPTION OF DESIGN MODIFICATIONS:

1. This Technical Memorandum (TM) No. 7 - Vapor Well Construction Details, describes the placement, screening intervals and construction details for the proposed site vapor monitoring wells. The proposed wells are to serve two objectives:

   - Establish a site perimeter monitoring network.
   - Monitor selected locations in the interior of the site (e.g., near buildings, within sludge material).

   This TM is prepared in response to EPA's request in their November 24, 1997 letter and to verbal comments discussed at the November 19, 1997 Technical Exchange Meeting.

2. The main activities proposed under this TM include the following:

   - Installation of 15 perimeter vapor monitoring wells.
   - Installation of 6 interior vapor monitoring wells.

   The rationale for well placement and screening interval is discussed in the following section (Section 2.0). Construction details for the vapor wells are also discussed in Section 3.0.

3. A minor activity proposed under this TM is the collection of surface and shallow soils from the interior of the site for geotechnical analyses. The rationale and methodology for this activity is discussed in Section 3.0.

4. The subsurface data collected during well installation, subsequent subsurface gas monitoring data and data from surface and subsurface soil samples will be factored into the remedial design for the site, as is appropriate.

2.0 RATIONALE FOR DESIGN MODIFICATIONS:

1. Placement, screening intervals and construction details for the proposed vapor wells were originally described in the RD Investigative Activities Workplan (Rev. 2.0). This TM presents modifications to the original plans based on:

   - Subsurface data recently collected by EPA and WDIG.
   - Discussions with and comments provided by various oversight agencies.
   - Preliminary in-business air and vapor well monitoring data.

2. The surface and shallow soil sampling activity is proposed via this TM because: (1) geotechnical data from interior surface and shallow soils is a necessary set of data for design purposes; and (2) it is time and cost efficient to perform the sampling activities during the vapor well installation field effort.

SUBJECT: Vapor Well Construction Details **DATE:** November 25, 1997

3.0 ENGINEERING MODIFICATIONS TO SUPPORT THE TECHNICAL MEMORANDUM:

3.1 VAPOR WELLS CONSTRUCTION DETAILS

1. Figure 1 shows the locations of the proposed vapor wells. There are 15 perimeter vapor wells and 6 interior vapor wells. Additionally, there are currently 26 existing vapor wells. Table 1 summarizes the placement and rationale of the existing and proposed wells.

2. Figures 2, 3 and 4 show cross-sections along the site perimeter and at key interior locations. The objective of the cross-sections is to provide the graphical representation of subsurface conditions used to determine the screened zones of the nested monitoring probes. Table 2 gives a summary of the screened and seal intervals of the vapor wells. During installation, however, it will be the actual soil core observed that will be the final determining factor for the vapor screened intervals. As was discussed during the November 19, 1997 Technical Exchange Meeting, a representative of the EPA will be available in the field in order to review and approve the final screening intervals for each vapor well.

3. As can be seen from the cross-sections, the main objectives of the multiple screened zones are to:
   - Monitor shallow soils, generally those found above sludge materials.
   - Monitor sludge materials or the zone at equal elevations to the nearest sludge materials.
   - Monitor soil beneath sludge materials or at the zone at equal elevations to the nearest beneath sludge soils.

   At certain perimeter locations (e.g., VW-35) two screened intervals are proposed. These two screened vapor wells are appropriate because:
   - Wells are located approximately 250 feet from the nearest sludge location.
   - Wells are in soils that generally conform to two distinct types; fine-grained and coarse-grained, and ground water is generally at 35 to 40 feet below ground surface.

4. Figure 5 shows the construction details for the vapor wells. Generally, the wells will consist of 12- to 14-inch boreholes with two or three nested probes. The probes will be constructed of Schedule 40 PVC pipe, with screen openings of 0.04 inch. The filter pack will be 1/4-inch diameter pea gravel. Seals between screened intervals will be constructed of hydrated bentonite chips and neat cement grout.

5. The vapor well boreholes will be drilled using hollow stem auger drill rigs. Standard industry construction practices such as suspending casing during installation and tremmie pipe of grout will be used.

6. An air test will be completed following the completion of well installations to ensure the integrity of the well seals. A vacuum will be applied to each probe to observe any negative pressure readings on a magnahelic gauge attached to the remaining probe(s).

3.2 SURFACE AND SHALLOW SOIL SAMPLING

1. Approximately 10 shallow borings are proposed to be completed at various interior locations, shown in Figure 6, to obtain surface and shallow soil samples for geotechnical analyses. These borings will be completed using a hollow stem auger rig. It is proposed to obtain the following from each boring:
   - Two standard penetration tests.
   - One Shelby tube sample.
   - One 2-gallon bulk sample.

   The collected samples will be transported to TRC's Irvine facility for storage. The Shelby tube samples will be preserved using paraffin wax at the tube ends.

2. The purpose of the collected soil samples is to perform various geotechnical analyses. These analyses may include moisture, density, proctor, sieve and strength. A separate TM will be submitted to EPA to propose the geotechnical analyses' rationale and schedule.

SUBJECT: Vapor Well Construction Details **DATE:** November 25, 1997

4.0 POTENTIAL IMPACTS ON RD FIELD SCHEDULE:

1. The schedule for the proposed activities under this TM is shown in Table 3. It is anticipated, outside of extreme weather conditions, that this work will be completed in early January 1998, in time to complete quarterly surface gas monitoring in mid to late January 1998.

5.0 AMENDMENTS TO QAPP AND SAP TO REFLECT MODIFICATIONS:

1. Table 4 lists the sections of the existing QAPP and FSAP that are pertinent to the activities proposed under this TM.

RPM APPROVAL STATUS:

BY: ______________________ **DATE:** ______________

_____ **Approved** _____ **Disapproved** _____ **Additional Information Required**

TABLE 1

EXISTING AND PROPOSED SITE VAPOR WELLS
WASTE DISPOSAL, INC. SUPERFUND SITE

WELL NO.	SITE LOCATION	WELL TYPE	SAMPLING RATIONALE	WELL CONSTRUCTION
Existing				
VW-01	Area 2	Interior (Outside Reservoir)	Monitor subsurface gas conditions outside of buried reservoir.	Single screened interval from 5 to 35 feet.
VW-02	Area 2	Interior (Outside Reservoir)		
VW-03	Area 2	Interior (Outside Reservoir)		
VW-04	Area 2	Interior (Outside Reservoir)		
VW-05	Area 2	Interior (Outside Reservoir)		
VW-06	Area 4	Interior (Vacant Area)	Monitor subsurface gas conditions on vacant portions of the site, near a covered disposal pit.	
VW-07(1)	Area 5	–	Replaced by VW-30.	
VW-08	Area 2	Interior (Outside Reservoir)	Monitor subsurface gas conditions around buried reservoir.	
VW-09	Reservoir	Reservoir	Monitor gas conditions in reservoir.	
VW-10	Area 1	Interior (Near Existing Buildings)	Monitor subsurface gas conditions adjacent to existing site buildings; subject to CIWMB 1.25 percent methane standard and EPA's Interim Action Levels for benzene and vinyl chloride.(4)	
VW-11	Area 1	Interior (Near Existing Buildings)		
VW-12	Area 6	Interior (Vacant Area)	Monitor subsurface gas conditions on vacant portions of the site.	
VW-13	Area 8	Interior (Near Existing Buildings)	Monitor subsurface gas conditions adjacent to existing site buildings; subject to CIWMB 1.25 percent methane standard and EPA's Interim Action Levels for benzene and vinyl chloride.(4)	
VW-14	Area 8	Interior (Near Existing Buildings)		
VW-15(2)	Area 2	–	Replaced by VW-43.	
VW-16	Area 1	Interior (Near Existing Buildings)	Monitor subsurface gas conditions adjacent to existing site buildings; subject to CIWMB 1.25 percent methane standard and EPA's Interim Action Levels for benzene and vinyl chloride.(4)	
VW-17	Area 1	Interior (Near Existing Buildings)		
VW-18	Area 1	Interior (Near Existing Buildings)		
VW-19(3)	Area 8	–	–	

(1) Well is inaccessible due to landscaping.
(2) Well is inaccessible due to well head damage.
(3) Well cannot be located due to paving constructed over well.
(4) It is understood that these existing wells are not constructed properly and therefore, cannot function as compliance wells. However, they can be used as indicators of potential elevated subsurface gas conditions.

TABLE 1

EXISTING AND PROPOSED SITE VAPOR WELLS
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

WELL NO.	SITE LOCATION	WELL TYPE	SAMPLING RATIONALE	WELL CONSTRUCTION
VW-20	Area 8	Interior (Near Existing Buildings)	Monitor subsurface gas conditions adjacent to existing site buildings; subject to CIWMB 1.25 percent methane standard and EPA's Interim Action levels for benzene and vinyl chloride.(4)	Single screened interval from 5 to 35 feet.
VW-21	Area 8	Interior (Near Existing Buildings)		
VW-22	Area 8	Interior (Near Existing Buildings)		
VW-23	Area 8	Interior (Near Existing Buildings)		
VW-24	Area 8	Interior (Near Existing Buildings)		
VW-25	Area 7	Interior (Vacant Area)	Monitor subsurface gas conditions near a covered disposal pit.	
VW-26	Area 7	Interior (Vacant Area)		
Proposed(5)				
VW-27	Area 2	Interior (Outside Reservoir)	Obtain subsurface gas data within sump material between reservoir and existing wells with elevated methane or VOCs.	3 screened zones
VW-28	Area 3	Perimeter	Monitor subsurface gas data around perimeter of the site; subject to CIWMB 5 percent methane standard.	2 screened zones
VW-29	Area 4	Perimeter	Monitor subsurface gas data around perimeter of the site near to sump material; subject to CIWMB 5 percent methane standard.	3 screened zones
VW-30	Area 5	Perimeter (Near Existing Buildings)	Monitor subsurface gas conditions around the perimeter of the site and adjacent to existing site building; subject to CIWMB 1.25 percent methane standard and EPA's Interim Action levels for benzene and vinyl chloride. Replace existing vapor well (VW-07).	
VW-31	Area 6	Perimeter	Monitor subsurface gas conditions around perimeter of the site; subject to CIWMB 5 percent methane standard.	2 screened zones
VW-32	Area 7	Perimeter		3 screened zones
VW-33	Area 8	Perimeter (Near Existing Buildings)	Monitor subsurface gas condition around portions of the perimeter of the site adjacent to existing site buildings; subject to CIWMB 1.25 percent methane standard and EPA's Interim Action levels for benzene and vinyl chloride.	2 screened zones
VW-34	Area 8	Perimeter (Near Existing Buildings)		3 screened zones
VW-35	Area 1	Perimeter (Near Existing Buildings)		2 screened zones

(4) It is understood that these existing wells are not constructed properly and therefore, cannot function as compliance wells. However, they can be used as indicators of potential elevated subsurface gas conditions.

(5) The locations and well constructions are considered approximate. The location may be slightly moved to accommodate surface/subsurface obstructions. The well constructions may be changed based on field conditions.

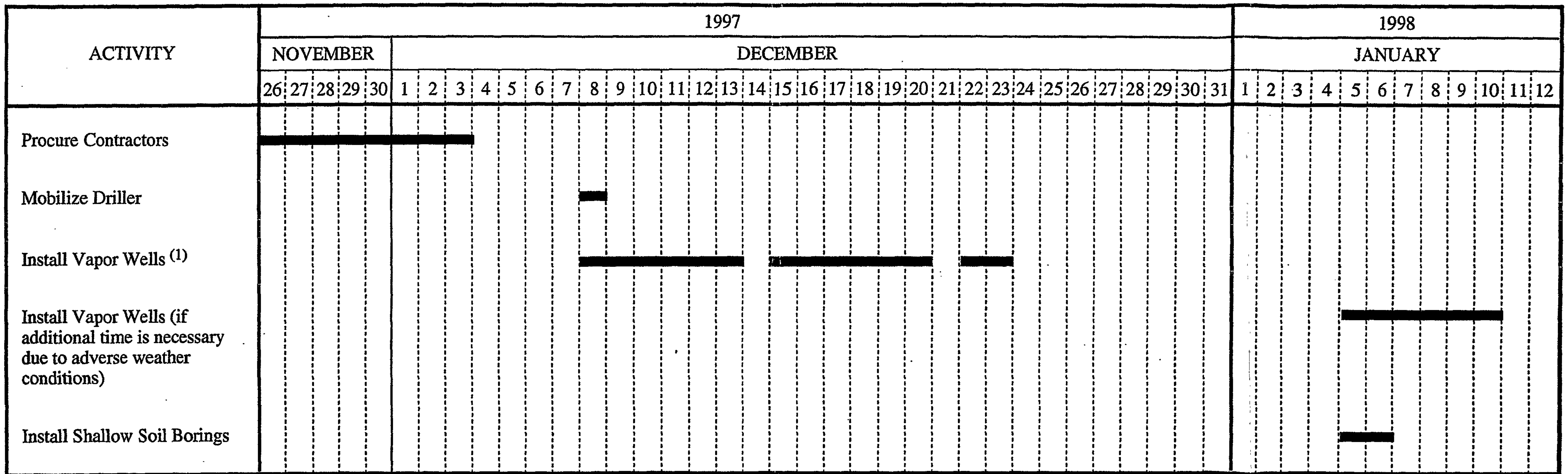
TABLE 1

EXISTING AND PROPOSED SITE VAPOR WELLS WASTE DISPOSAL, INC. SUPERFUND SITE (Continued)

WELL NO.	SITE LOCATION	WELL TYPE	SAMPLING RATIONALE	WELL CONSTRUCTION
VW-36	Area 1	Perimeter (Near Existing Buildings)	Monitor subsurface gas condition around portions of the perimeter of the site adjacent to existing site buildings; subject to CIWMB 1.25 percent methane standard and EPA's Interim Action Levels for benzene and vinyl chloride.	2 screened zones
VW-37	Area 1	Perimeter	Monitor subsurface gas condition around perimeter of the site; subject to CIWMB 5 percent methane standard.	
VW-38	Area 1	Perimeter (Near Existing Buildings)	Monitor subsurface gas condition around portions of the perimeter of the site adjacent to existing site buildings; subject to CIWMB 1.25 percent methane standard and EPA's Interim Action Levels for benzene and vinyl chloride.	
VW-39	Area 1	Perimeter (Near Existing Buildings)		
VW-40	Area 1	Perimeter (Near Existing Buildings)		
VW-41	Area 2	Perimeter	Monitor subsurface gas conditions around perimeter of the site and adjacent to school athletic field; subject to CIWMB 5 percent methane standard.	
VW-42	Area 2	Perimeter		
VW-43	Area 2	Interior (Outside Reservoir)	Obtain subsurface gas data between reservoir and existing building; Replace existing vapor well (VW-15).	3 screened zones
VW-44	Area 1	Interior (Outside Reservoir/ Near Existing Buildings)	Obtain subsurface gas data between reservoir and adjacent to existing site buildings; subject to CIWMB 1.25 percent methane standard and EPA's Interim Action levels for benzene and vinyl chloride.	
VW-45	Area 2	Interior (Outside Reservoir/Near Existing Buildings)		
VW-46	Area 1	Interior (Outside Reservoir/Near Existing Buildings)		
VW-47	Area 2	Interior (Outside Reservoir)	Obtain subsurface gas data between reservoir and existing buildings; subject to 5 percent methane standard.	

TABLE 3

IMPLEMENTATION SCHEDULE
TM NO. 7
WASTE DISPOSAL, INC. SUPERFUND SITE



94-256 (TM#7) (11/25/97/ks)

(1) Assumes two drilling rigs working concurrently.

TRC

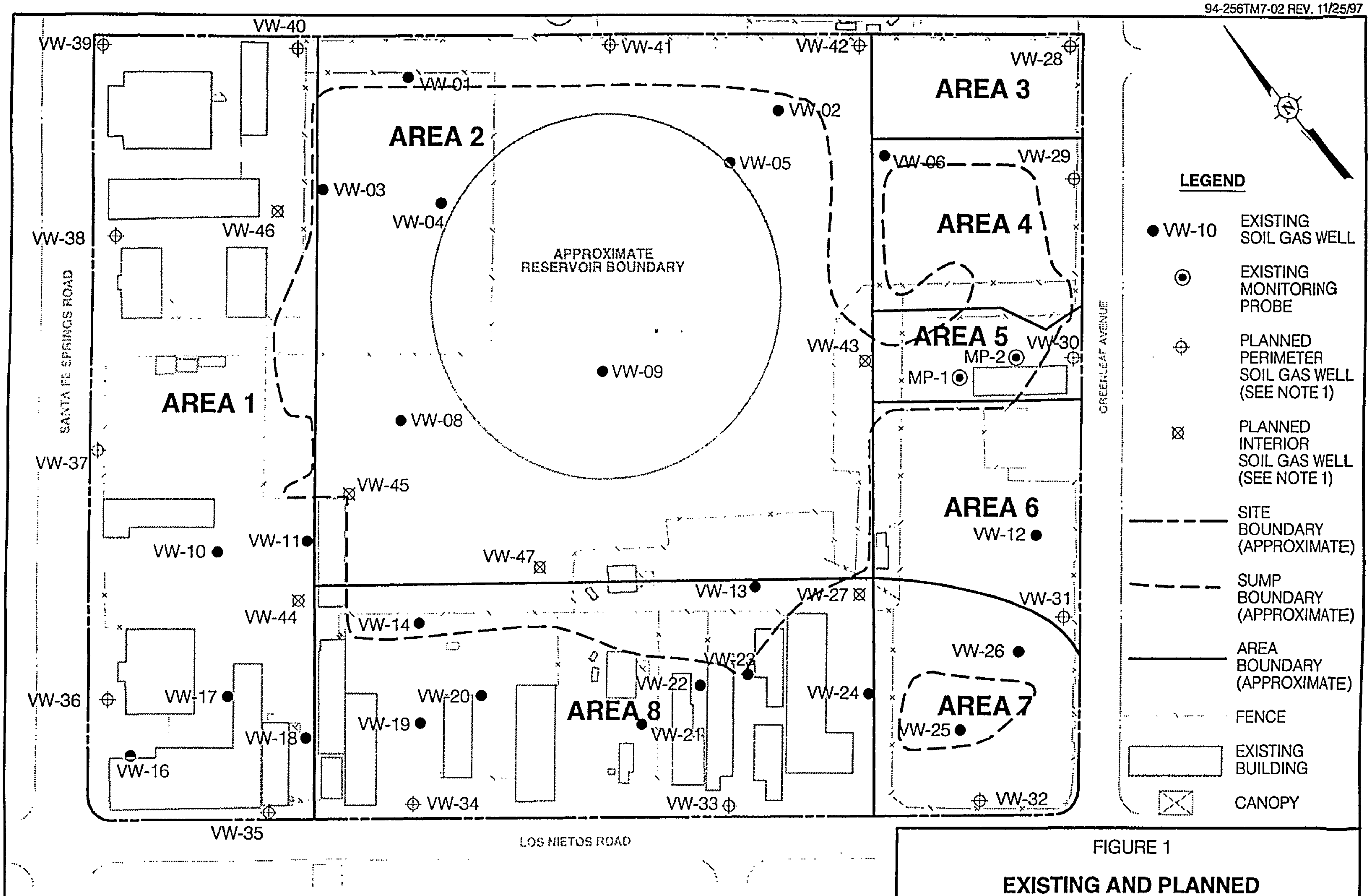
TABLE 4

PERTINENT SECTIONS OF RD INVESTIGATIVE ACTIVITIES WORKPLAN FSAP AND QAPP WASTE DISPOSAL, INC. SUPERFUND SITE

FSAP (Rev. 3.0, 9/11/97)			QAPP (Rev. 3.0, 9/11/97)		
Section A.5.1.2.1	-	Vapor Well Location and Underground Utility Clearance	Section B.5.1	-	Sample Designation
Section A.5.1.2.2	-	Borehole Drilling for Installation of Vapor Wells and Shallow Soil Gas Probes	Section B.5.3.1	-	Borehole Logging
Section A.5.2	-	Decontamination	Section B.5.3.3	-	Field Parameter
Section A.5.3	-	Disposal of Soil Cuttings, Purged Ground Water and Associated Sampling Wastes	Section B.5.3.3.1	-	Soils
Section A.5.7	-	Sample Documentation			

94-256 (TM#7) (11/25/97/ks)

94-256TM7-02 REV. 11/25/97



NOTE 1: PLANNED SOIL GAS WELL LOCATIONS ARE APPROXIMATE AND MAY BE SLIGHTLY MOVED TO ACCOMODATE SURFACE/SUBSURFACE OBSTRUCTIONS.

REFERENCE: BASED ON FIGURES 2.3 AND 2.7, FINAL REMEDIAL INVESTIGATION REPORT, EBASCO, 1989d.

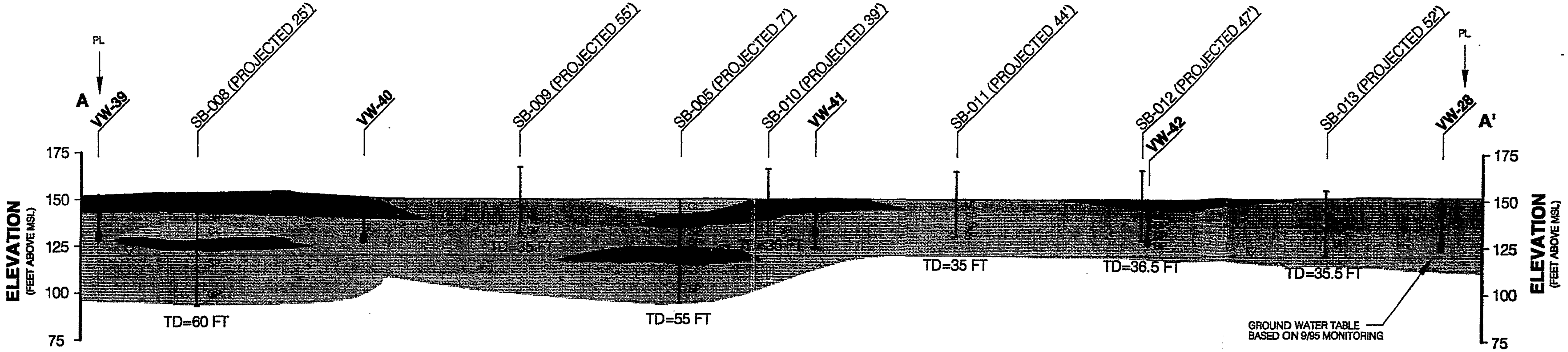
FIGURE 1

EXISTING AND PLANNED SOIL GAS WELL LOCATIONS

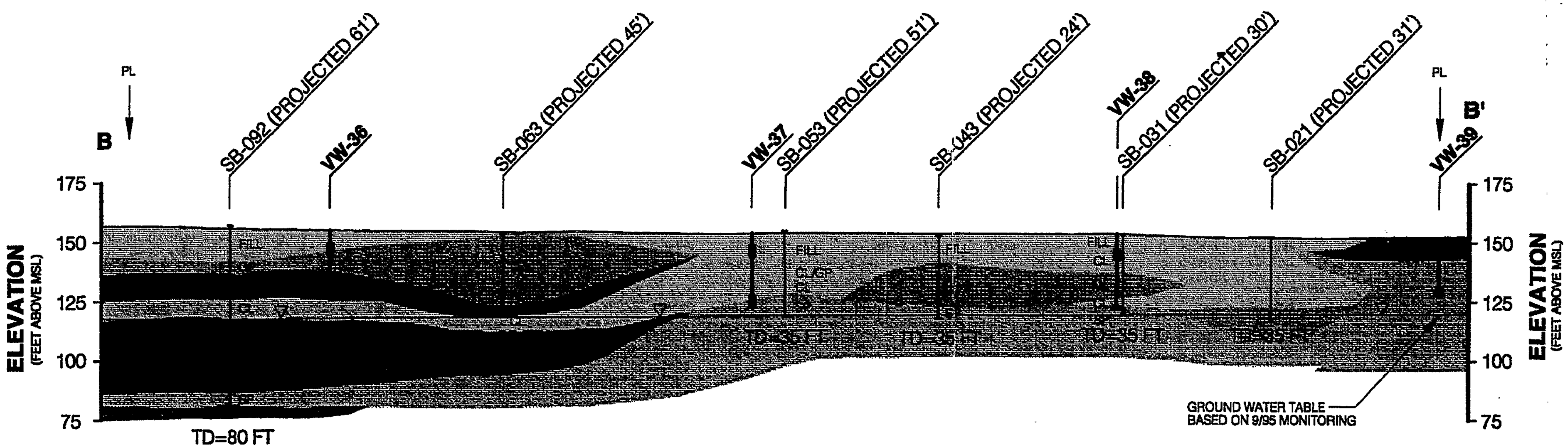
WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

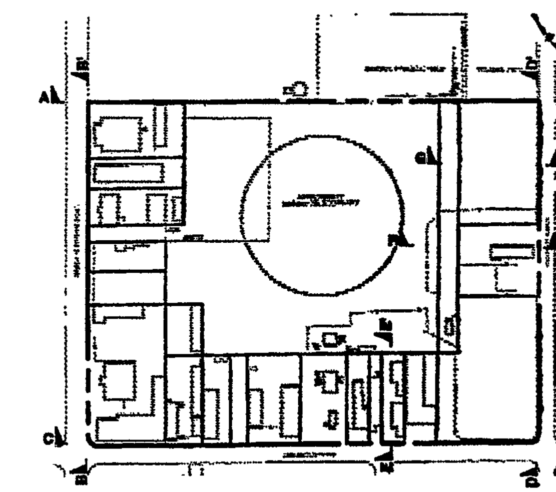
94-256TM7-03 REV.11/25/97



LOOKING NORTHEAST



LOOKING NORTHWEST



SECTION LOCATION MAP

0 30 60 120 FEET

VERTICAL SCALE

0 60 120 240 FEET

HORIZONTAL SCALE

LEGEND

- FILL
- SM, ML, CL – FINE GRAINED SOILS
- SP, GP – COARSE GRAINED SOILS

NOTE

1. THE ACTUAL SCREEN DEPTHS AND INTERVALS FOR PLANNED VAPOR PROBES MAY CHANGE TO ACCOMODATE SURFACE/SUBSURFACE CONDITIONS.

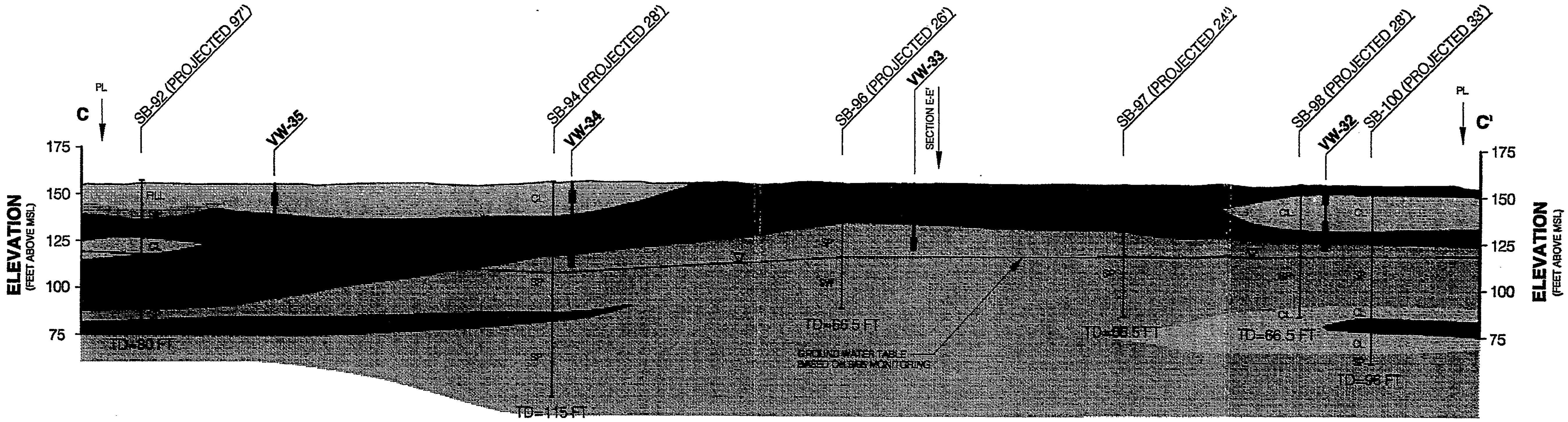
FIGURE 2

CROSS SECTIONS A-A' & B-B'

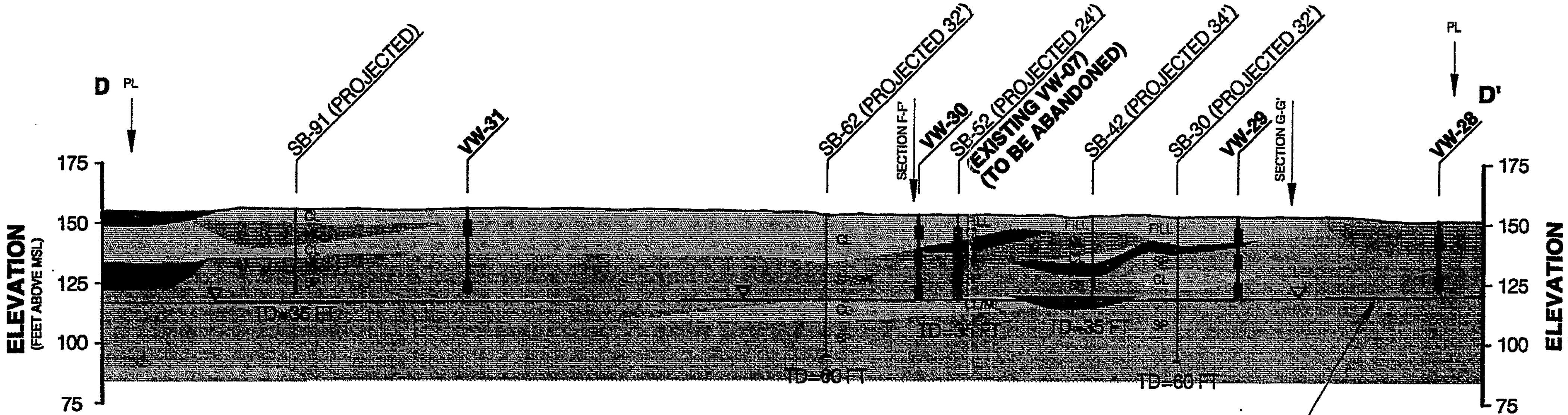
WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

94-256TM7-04 REV.11/25/97

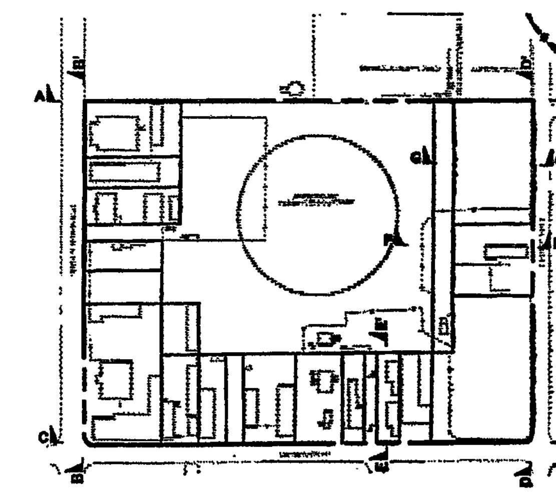


LOOKING NORTHEAST



LOOKING NORTHWEST

GROUND WATER TABLE BASED ON 9/95 MONITORING



SECTION LOCATION MAP

0 30 60 120 FEET

VERTICAL SCALE

0 60 120 240 FEET

HORIZONTAL SCALE

LEGEND

- FILL
- SM, ML, CL — FINE GRAINED SOILS
- SP, GP — COARSE GRAINED SOILS

NOTE

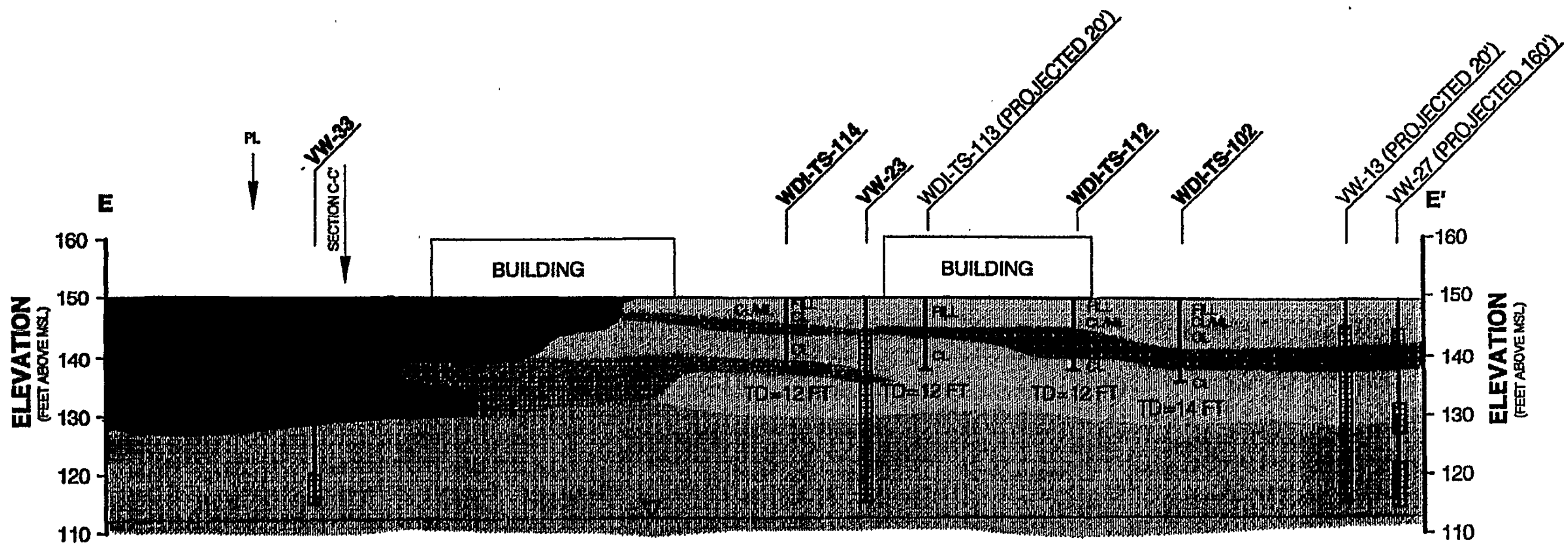
1. THE ACTUAL SCREEN DEPTHS AND INTERVALS FOR PLANNED VAPOR PROBES MAY CHANGE TO ACCOMODATE SURFACE/SUBSURFACE CONDITIONS.

FIGURE 3

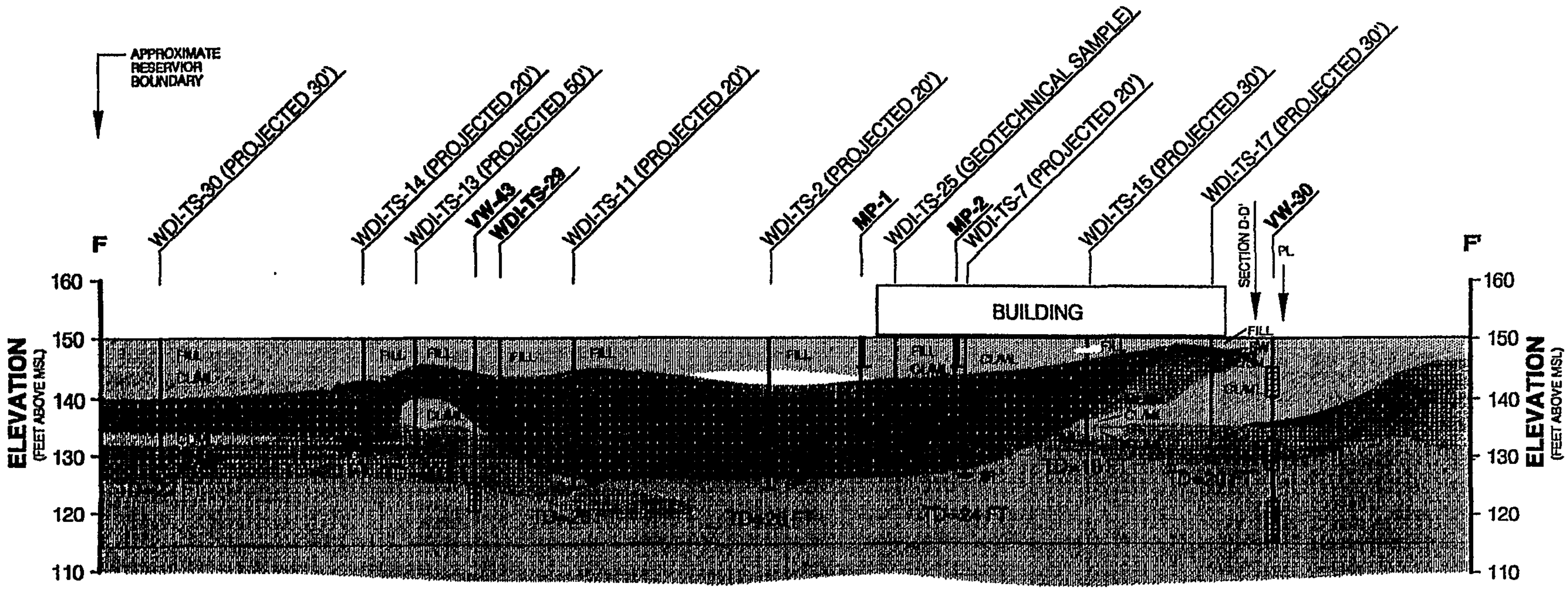
CROSS SECTION C-C' & D-D'

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

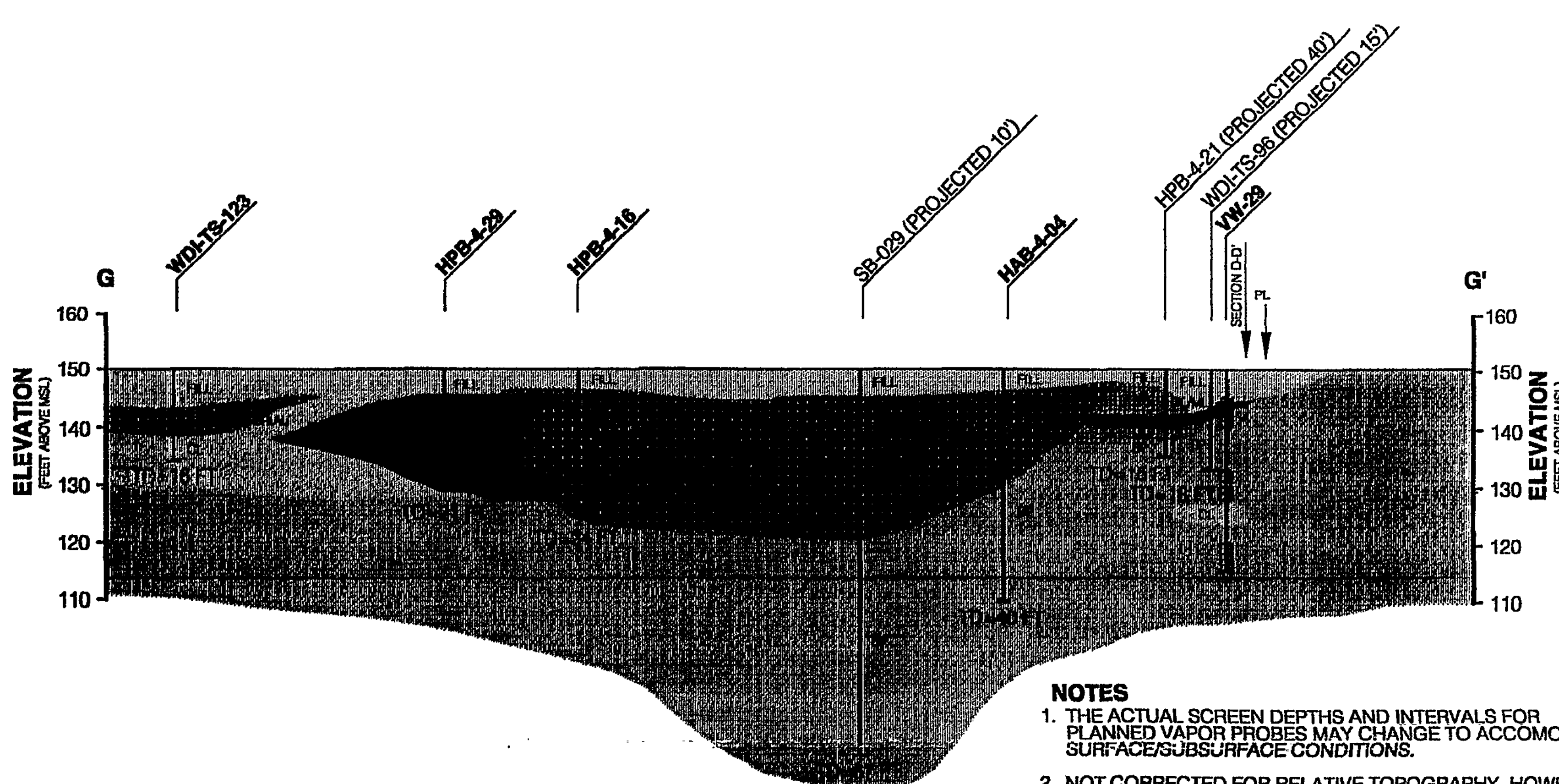
TRC



LOOKING WEST



LOOKING NORTH



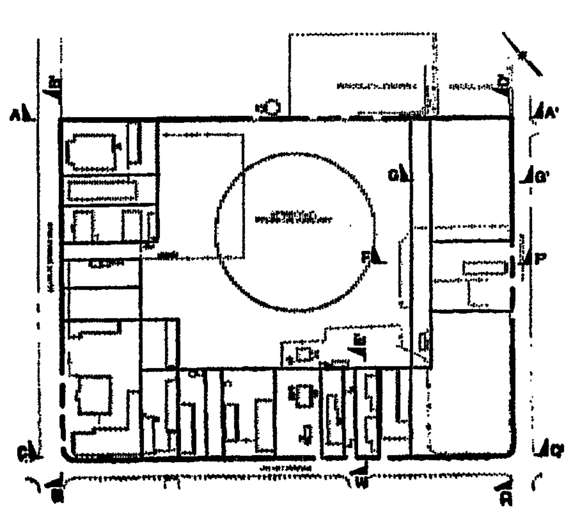
LOOKING NORTH

NOTES

1. THE ACTUAL SCREEN DEPTHS AND INTERVALS FOR PLANNED VAPOR PROBES MAY CHANGE TO ACCOMODATE SURFACE/SUBSURFACE CONDITIONS.
2. NOT CORRECTED FOR RELATIVE TOPOGRAPHY, HOWEVER SURFACE AT SECTION LOCATIONS IS RELATIVELY FLAT. CORRECTIONS WILL BE MADE AFTER BORINGS HAVE BEEN SURVEYED.

LEGEND

- FILL
- PUTTY
- SUMP MATERIAL
- SM, ML, CL — FINE GRAINED SOILS
- SP, GP — COARSE GRAINED SOILS



SECTION LOCATION MAP

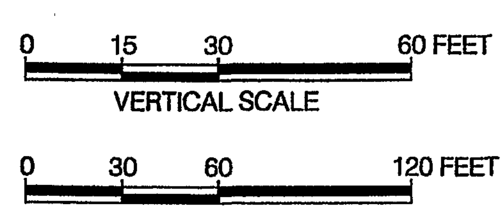


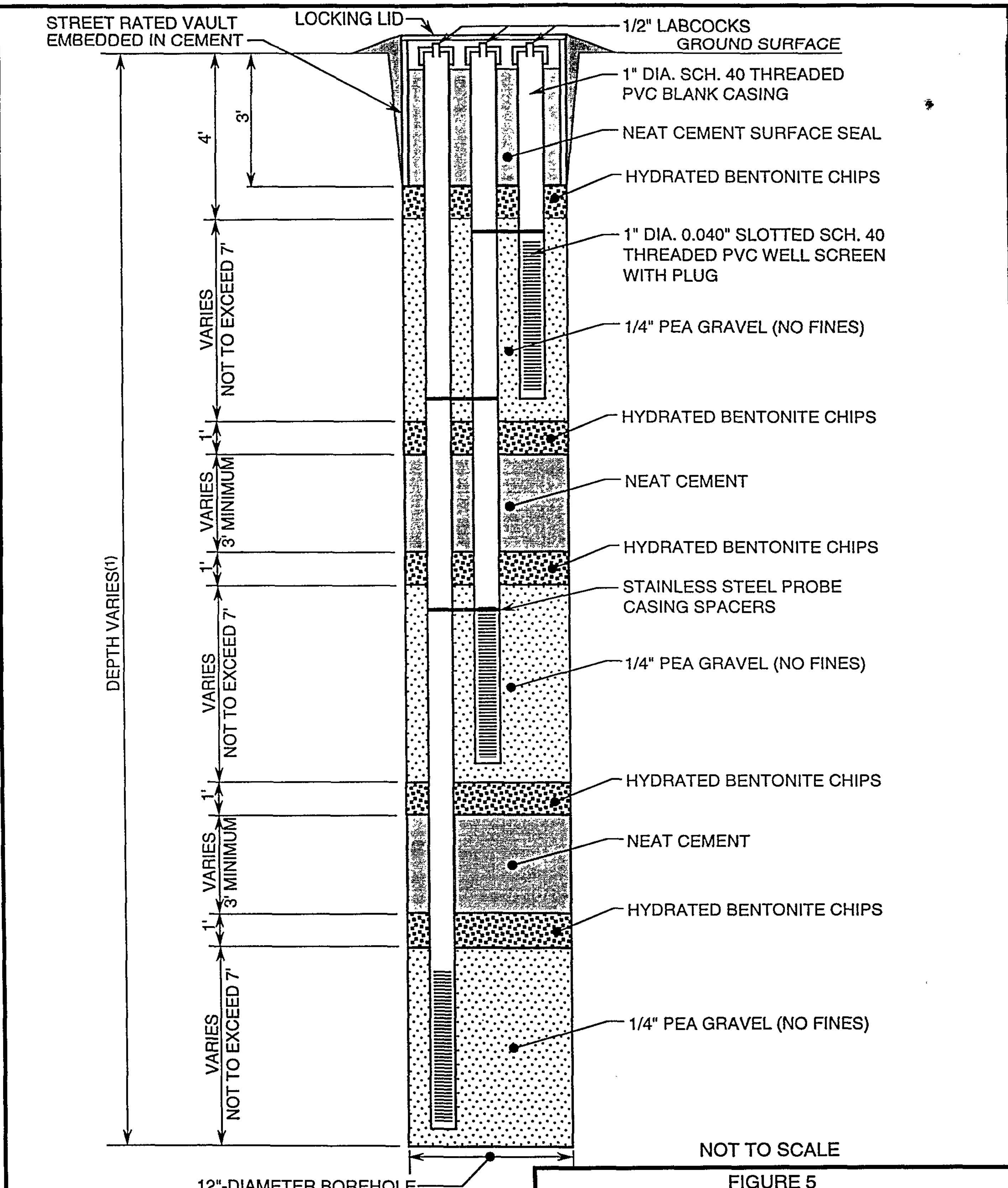
FIGURE 4

CROSS SECTION E-E', F-F' AND G-G'

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

94-256TM7-01 REV. 11/25/97



NOTE:
1. WELL DEPTHS AND SCREENED INTERVALS MAY VARY TO ACCOMODATE SUBSURFACE CONDITIONS.
2. THE CASINGS WILL BE SUSPENDED DURING CONSTRUCTION TO MINIMIZE CASING CURVATURE.
3. WELLS COMPLETED IN IMPACTED SOILS WILL HAVE A 1-FOOT THREADED PVC BLANK PLUG TO COLLECT POTENTIAL LIQUIDS.
4. NEAT CEMENT SEAL WILL BE TREMIED INTO BOREHOLE.

FIGURE 5

TYPICAL VAPOR WELL CONSTRUCTION DIAGRAM

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

EPA/WDIG
CORRESPONDENCE

3.0

TECHNICAL MEMORANDUM NO. 8
WASTE DISPOSAL, INC. SUPERFUND SITE

SUBJECT: Additional Reservoir Liquids Extraction Well and Vapor Well/Probe Sampling

DATE: January 19, 1998

SUBMITTED TO: Andria Benner, U.S. EPA
Cynthia Wetmore, U.S. EPA

PROJECT NO.: 94-256

SUBMITTED BY: Ian Webster, WDIG Project Coordinator

cc:
James Barton, COE
Keith Elliott, RWQCB
Shawn Haddad, DTSC
Pat Hotra, SCAQMD
Andy Lazzaretto, City of Santa Fe Springs
Virginia Maloles, LA County DOHS
Neal Navarro, COE
Shelby Moore, Esq., WDIG
Bill Nelson, ATSDR
Darryl Petker, CIWMB
Roberto Puga, TRC
Stan Smucker, Ph.D., EPA
Kathy Steuer, Esq., EPA, ORC
Dave Taylor, EPA
Clement Walsh, CADHS
John Wondolleck, CDM Federal
WDIG Members

1.0 DESCRIPTION OF DESIGN MODIFICATIONS:

1. This Technical Memorandum (TM) No. 8 - Additional Reservoir Liquids Extraction Well and Vapor Well/Probe Sampling, describes the field and analytical procedures proposed to evaluate two recent field observations noted at the site. These two observations are:

   - The liquids extraction well installed at the site December 12, 1997 under TM No. 6 has not collected liquids. The most recent monitoring activities on December 16, 1997 were performed four days following completion of the well. This observation has been verified by EPA oversight personnel.
   - Recent vapor well/probe monitoring data collected by EPA oversight personnel had indicated that methane concentrations were detected as high as 100% in various wells/probes located on site. These measurements were also observed by WDIG personnel on December 16, 1997.

   These observations warrant some additional field investigations. The objectives of the additional work are to further understand the mechanisms or phenomena that produce these observations.

2. The proposed activities will consist of the following:

   - Construction of a new reservoir liquids extraction well, WDI-EX-2, at the location shown on Figure 1.
   - Collection of Shelby tube samples from the borehole for the new extraction, and additionally, from a borehole placed adjacent to the existing dug extraction well, WDI-EX-1. Samples will be collected from the overlying soil fill and impacted material.
   - Perform geotechnical analyses of the Shelby tube samples, including the following:
     - Moisture and density (ASTM-D-2937)
     - Sieve analysis (ASTM-D-1140)
     - Hydraulic conductivity (ASTM-API-RP-40)
   - Collection of soil vapor samples from the following wells/probes:
     - VW-25 VW-PB-4
     - VW-09 VW-PB-6
     - VW-PB-1 VW-PB-2

SUBJECT: Additional Reservoir Liquids Extraction Well and Vapor Well/Probe Sampling **DATE:** January 19, 1998

Soil vapor samples will be collected by 1) taking Summa canister samples from the well/probe prior to purging a maximum of one well volume (i.e., gas concentrations measured at 100% methane) and 2) a sample collected using the procedures in the RD Investigation Activities FSAP and QAPP (i.e., purging of well prior to collecting Sumna canister sample). The samples will be analyzed for methane and VOCs per the analytical procedures outlined in the FSAP and QAPP.

3. The well installed and data collected will be used to:
   - Perform the free product and aqueous liquid pump test per TM No. 6.
   - Compare the geotechnical characteristics of the material at the location of the existing dry well versus the proposed extraction well.
   - Determine if the high methane concentrations noted in the wells/probes are truly representative of subsurface conditions or are a function of an in-well/mechanism.

The information gathered will be factored into the remedial design for the site.

2.0 RATIONALE FOR DESIGN MODIFICATIONS:

1. The proposed location for the new extraction well, WDI-Ex-2, is located adjacent to the existing monitoring probe WDI-P-1. The rationale for installing this well adjacent to WDI-P-1 is based on the following:
   - WDI-P-1 contains a significant thickness (i.e., 2.2 feet) of free product[(1)].
   - Centrally located with respect to other monitoring probes (WDI-P-1 to 4 and VW-09).
   - Liquids entered this probe within 25 hours of completion.
2. The absence of liquids from the newly constructed extraction well, WDI-EX-1, is surprising since several wells/probes within a 50-foot radius contain varying thickness of free product (0.5 to 5.7 feet) and water. It should be noted that EPA constructed vapor well VW-09 in 1988 to obtain vapor samples in the reservoir. There is no mention in the Soil Gas Characterization Report of liquids accumulating in VW-09 during the installation of the well. However, in 1995, several feet of liquids were encountered in the vapor well prior to sampling. Considering this phenomenon, similar conditions may be occurring at WDI-EX-1 where extremely low flow rates of liquids are progressing to the well. The geotechnical data collected at the dry well location and at the location of the proposed well could show some material and hydraulic conductivity differences that may account for the widely different hydraulic behavior at the two locations.
3. The high methane concentrations being measured in the field are not indicative of the concentrations previously measured at the site, as shown on Table 1. This high degree of disparity may be a function of in-well mechanisms or phenomena that concentrate the methane as opposed to the true subsurface methane condition. This uncertainty could be resolved by collecting analytical samples of the gas collected in the well (non-purged sample) and of the gas from outside the well (purged sample).

3.0 ENGINEERING MODIFICATIONS TO SUPPORT THE TECHNICAL MEMORANDUM:

1. The proposed extraction well, WDI-EX-2 will be constructed using the techniques, construction materials and construction design specified for well WDI-EX-1 in TM No. 6. Also, every effort will be made to disturb the borehole during drilling to allow the maximum amount of fluids to enter the borehole. Should no liquids enter into the borehole, the borehole will be further disturbed to encourage liquids to enter.

---

(1) Thickness of free product measured on December 16, 1997.

SUBJECT: Additional Reservoir Liquids Extraction Well and Vapor Well/Probe Sampling **DATE:** January 19, 1998

2. The Shelby tube samples will be capped, labeled and shipped per the procedures in the FSAP and QAPP. They will be analyzed for moisture, density, sieve and hydraulic conductivity per the ASTM methods cited in Section 1.

3. The soil gas samples will be collected per the procedures in the FSAP and QAPP, with the exception that one sample will be collected without purging, measuring or otherwise disturbing the condition in the well.

4.0 POTENTIAL IMPACTS ON RD FIELD SCHEDULE:

1. This activity will extend the RD Investigation Activities Schedule slightly. Due to contractor scheduling conflicts and the year-end holidays, these activities cannot begin until January 5, 1998.

5.0 AMENDMENTS TO QAPP AND FSAP TO REFLECT MODIFICATIONS:

1. None.

RPM APPROVAL STATUS:

BY: ______________________ **DATE:** ______________

_____ **Approved** _____ **Disapproved** _____ **Additional Information Required**

TABLE 1

SUMMARY OF VAPOR WELL/PROBE METHANE CONCENTRATIONS

VAPOR WELL/ PROBE NO.	SAMPLING EVENTS				WELLS PROPOSED TO BE SAMPLED AND ANALYZED UNDER TM NO. 8
	MARCH 1989(1)	JUNE 1995(2)	AUGUST 1997(3)	NOVEMBER 1997(4)	
VW-1	0.0	0.3	0	0	
VW-2	1.62	0.987	0	1.2	
VW-3	0.0	2.2	0.8	---	
VW-4	6.48	9.34	24	34	
VW-5	0.0	1.2	0	---	
VW-6	0.0	0.0	0	1	
VW-7	0.02	0.773	---	---	
VW-8	0.0	0.6	0.1	---	
VW-9	39.18	---	14.9	100	X
VW-10	0.09	0.5	0.2	---	
VW-11	0.82	1.4	1.3	---	
VW-12	0.0	0.0	12	1	
VW-13	0.0	1.6	0.6	---	
VW-14	3.08	1.05	1.7	---	
VW-15	1.87	---	---	---	
VW-16	0.0	0.0	0	---	
VW-17	0.0	0.0	0	---	
VW-18	0.0	4.0	0.3	---	

(1) Vapor well monitoring conducted by EPA during Remedial Investigation using approved FSAP and QAPP procedures.
(2) Vapor well monitoring conducted by WDIG during Predesign activities using approved FSAP and QAPP procedures.
(3) Vapor well monitoring conducted by EPA during Subsurface Gas Contingency Plan implementation using approved FSAP and QAPP procedures.
(4) Vapor well and probe monitoring conducted by EPA ERT as part of unscoped site investigation, not using approved FSAP and QAPP procedures.
--- = Not sampled.

EPA/WDIG
CORRESPONDENCE

recycled paper

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

January 9, 1998

Ian Webster, Sc.D.
WDIG Project Coordinator
10530 Floral Drive
Whittier, California 90606

Subject: Additional Comments on Technical Memorandum No. 8 (Additional Reservoir Liquids Extraction Well/Probe Sampling) - Waste Disposal, Inc. Superfund Site

Dear Dr. Webster:

Per my voice mail messages to you yesterday and today, the U.S. Environmental Protection Agency (EPA) approves the request from the WDIG to install a second liquids extraction well (WDI-EX-2). However, there are several editorial comments which need to be corrected in Technical Memorandum (TM) No. 8, which was faxed to EPA on January 8, 1998. EPA requests that the WDIG submit by Friday, January 16, 1998, a final copy of TM No. 8 incorporating the attached comments.

If you have any questions or need any additional information, please give me a call at (415) 744-2361.

Sincerely,

Andria Benner
Remedial Project Manager

cc: Pat Hotra, SCAQMD
Neal Navarro, Army Corps of Engineers
Andy Lazzaretto, City of Santa Fe Springs
Virginia Maloles, LA County DOHS
Clement Walsh, CADHS
Roberto Puga, TRC/ESI
Kathy Steuer, Esq., EPA, ORC
Darryl Petker, CIWMB
Shawn Haddad, DTSC
Bill Nelson, ATSDR
Stan Smucker, Ph.D., EPA
Keith Elliott, RWQCB
John Wondolleck, CDM Federal
Shelby Moore, Esq., WDIG

Attachment 1

EPA Comments on Technical Memorandum No. 8 (Additional Liquids Recovery Well)

1.0 Description of Design Modifications

1. Para. 2, Bullet 4 (Page 1). There is no vapor well designated as VW-PB-9; edit text to refer to VW-PB-06.
2. Para. 2, Bullet 4, Last Paragraph (Page 1). In the first sentence, edit text to include the following underlined text: "Soil vapor samples will be collected by 1) Taking Summa canister samples from the well/probe prior to purging" a maximum of one well volume " (i.e., gas concentrations measured at ... "

3.0 Engineering Modification to Support the Technical Memorandum

3. Para. 1 (Page 2.): After the first sentence, edit text to include the following underlined text: "The proposed extraction well, WDI-EX-2, will be ... in TM No. 6." Also, every effort will be made to disturb the borehole during drilling to allow the maximum amount of fluids to enter the borehole. Should no liquids enter into the borehole, the borehole will be further disturbed to break the borehole's seal to encourage liquids to enter.

Table 1, Summary of Vapor Well/Probe Methane Concentrations

4. First column, second to the last line: Table refers to VW-PB-9; edit table to refer to VW-PB-06.

WASTE DISPOSAL INC.
SUPERFUND SITE
Project Coordinator

January 19, 1998 Project No. 94-256

Ms. Andria Benner
U.S. Environmental Protection Agency
75 Hawthorne Street, No. H-7-2
San Francisco, California 94105-3901

<u>Transmittal</u>
<u>Technical Memorandum No. 8 (Revision 1.0)</u>
<u>Waste Disposal, Inc. Superfund Site</u>
<u>Santa Fe Springs, California</u>

Dear Ms. Benner:

Enclosed please find five (5) copies of Technical Memorandum (TM) No. 8 (Revision 1.0) - Additional Reservoir Liquids Extraction Well/Probe Sampling. The revised TM No. 8 was prepared in response to EPA's comments in its January 9, 1998 letter to the WDIG project coordinator.

The comments contained in EPA's January 9, 1998 letter were all incorporated, and therefore, a response table was not warranted for this submittal.

If you have any questions or comments, please call me at (562) 692-4535.

Sincerely,

Ian Webster /AJ

Ian A. Webster
WDIG Project Coordinator

IAW/JB:cl
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TECHNICAL MEMORANDUM NO. 9 (REV. 2.0)
WASTE DISPOSAL, INC. SUPERFUND SITE

SUBJECT: Gas Parameter Tests

DATE: April 14, 1998

SUBMITTED TO: Cynthia Wetmore, U.S. EPA

PROJECT NO.: 94-256

SUBMITTED BY: Ian Webster, WDIG Project Coordinator

CC: John Wondolleck, CDM
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1.0 DESCRIPTION OF DESIGN MODIFICATIONS:

1. This Technical Memorandum (TM) No. 9 (Rev. 2.0) - Gas Parameter Tests, describes the field, laboratory and analytical procedures proposed to evaluate soil vapor extraction (SVE) technology, in-situ, and laboratory measurements of gas generation rates. The purpose of these gas parameter tests is to investigate on-site vapor well/probe data, which has indicated potentially high methane concentrations in various on-site locations.

2. The fundamental parameters of gas generation, conductivity, advection and diffusion have been calculated for the specific conditions in the fill and sump-like material layers at the Waste Disposal, Inc. (WDI) Superfund site. These calculations were transmitted to EPA in the February 13, 1998 transmittal to Cynthia Wetmore titled "Calculations of Air Conductivity, Methane Generation and Advection" and the March 30, 1998 submission to Andria Benner titled "Preliminary Supplemental Site Characterization Report." The purpose of this TM is to describe four types of tests that will be used to develop additional field data on various gas parameters, including gas generation rates, conductivity and surface gas flux. The four types of tests are: (1) SVE from the layers adjacent to the sump-like material layer (i.e., separately from either the fill layer above the sump-like material layer or from the native soil layer beneath); (2) in-situ evaluation of gas generation rates and surface gas flux from a controlled volume of sump-like material; (3) laboratory tests of gas generation parameters measured on small samples of sump-like material taken from the field; (4) surface soil gas flux measurements.

3. This TM is arranged to first discuss the rationale for each type of test, followed by a description of the specific procedure for each and a description of the calculations that will be performed. This revision contains more detailed rationale and descriptions of field procedures and analysis of results. Field activities are expected to proceed with a design/build structure in which changes will be made real-time in experimental parameters as new information is obtained in the field, with EPA's representatives' concurrence. Each change in design or procedures made in the field will be documented, and will include a description of the change and the rationale for the change.

2.0 RATIONALE FOR SPECIFIC TESTS:

1. The rationale for each of the four different types of tests are described in the following separate subsections. Each test is intended to provide different, yet complementary, information on the rate of generation of various gas constituents and the total gas as well as the ability of these gases to migrate within and/or to be removed from either the fill layer overlying or the native soil beneath the sump-like material.

2. By employing the various discrete testing methods, an independent cross comparison of gas generation rate data may be possible.

3. Table 1 provides a summary of the relevant Constituents of Concern (COCs) for the various gas tests and the respective methods to be used for field monitoring and laboratory analyses. The table also gives the rationale for making the specific measurements.

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2.1 SVE TEST

1. The objectives of the SVE testing are to determine the following site-specific parameters for the various locations:
   - Air conductivity
   - SVE radius of influence
   - Flow rate versus vacuum
   - Long-term soil gas concentration trends (i.e., rebound)
   - Condensate production
   - Air handling and treatment effectiveness

2. The SVE tests will determine the ability of an induced vacuum to withdraw soil gas from five locations (see Figure 1) selected to represent the different combinations of proximity between sump-like material and onsite buildings. This ability or inability to withdraw soil gas will be critical to future consideration of SVE as a potentially viable remediation to control the potential pathways for gas, generated in the sludge-like material, to migrate toward buildings and the ground surface. The potential for soil gas migration control by SVE will be evaluated as part of this TM.

3. More specifically, gas emitted from the top of the sump-like material would be expected to migrate upwards towards the ground surface and potentially to the bottom of slabs beneath commercial/industrial buildings. In contrast, gas emitted from the bottom surface of the sump-like material would be expected to migrate laterally until it reaches the edge of the confining area. At that point, migration could proceed both laterally outwards and vertically upwards towards the surface.

4. The five locations for these tests are based on the presence of sump-like material near potential surface receptors such as on-site commercial/industrial buildings. The volume flow rates achieved in the extraction well from specified vacuum levels applied by the blower will provide an indication of the air conductivity of each of these two layers at each of the five test locations. The product of the constituent concentrations and volume flow rates will provide the constituent generation rate from the sump-like material into the collection layer for the area of influence as indicated by the responses at the surrounding monitoring wells.

2.2 CONTROLLED-VOLUME IN-SITU PIPE TEST

1. In-situ gas generation testing is based on creating a vertical gas impermeable boundary to prevent outward lateral migration from a volume of sump-like material. The gas generation migrating vertically away from this volume of sump-like material will be measured in the following three locations:
   - The fill material above the sump-like material layer
   - The soil surface adjacent to the pipe
   - The native soil layer beneath the sump-like material layer

   Such a test offers an opportunity to determine the rate at which gas is generated in a known volume of sludge material. This test will be conducted using a large diameter (e.g., 24-inch) pipe which will be driven into the soil to a predetermined depth that includes the fill layer, sump-like material layer and native soil beneath.

2. The method to install the 24-inch diameter pipe will be a percussion casing driver. Monitoring probes will be installed using a direct push process. A completion diagram and equipment specifications will be provided to EPA for discussion at the next gas subgroup telecon.

3. A detailed description of the installation and testing procedures for the in-situ testing is provided in Section 3.2

2.3 LABORATORY TEST

1. The laboratory gas generation testing will be used to more precisely measure the total and constituent gas generation rate of a specific volume of sludge material that has been removed from selected locations at the site. Samples of the sludge material will be placed in a laboratory apparatus specially designed to allow measurement of the identity and rate at which constituent gas is generated by the sump-like material under anaerobic conditions in the absence of light.

2. Parameters associated with microbial generation of gas, including microbial counts, nutrient concentrations and pH, will be measured as potential predictors of microbial gas generation activity.

3. The data developed during the laboratory testing will be used to evaluate the potential gas generation rates and the gas quality. The laboratory-measured gas generation rate will be compared to the rates calculated in the February 13,1998 and March 10, 1998 submittals to EPA.

2.4 FLUX MEASUREMENTS

1. The flux measurements will be used to more precisely measure the surface soil gas flux in the selected test areas. To determine the surface soil gas flux, measurements will be made using a standard flux box unit as shown in Figure 2. This unit is sealed to the surface of the soil and then allowed to stand undisturbed, to allow the emission rate to equilibrate.

2. The data developed will be used to help evaluate surface emissions relative to the SVE and in-situ tests.

3.0 DESCRIPTION AND PROCEDURES FOR TESTS

1. The procedure and conditions for each of the tests are described in the following sections. Enough detail is provided to describe the scale and sequence of activities in each test. Some test conditions will be adjusted in the field based on early results from tests conducted on a design/build basis.

2. The results of the tests will be used to calculate the following gas parameters:
   - Air conductivity (from SVE)
   - Methane (CH_4) and total nonmethane organic compound (TNMOC) generation rate
   - Benzene (B_z), vinyl chloride (VC), trichloroethene (TCE), tetrachloroethene (PCE), and other volatile organic compound (VOC) emission rates

3.1 SVE TEST

1. The approximate location for each of the five soil vapor extraction tests are shown in Figure 1. These locations were selected in joint meetings of the EPA team and the WDIG based on the vapor well data and the location of sump-like materials. A summary of the locations and well information is provided in Table 3. Appendix A provides a list of existing vapor wells, construction data, and latest constituent concentrations measured. These concentrations indicate the relative amount of subsurface contaminants, both at locations chosen and not chosen for SVE.

2. At each of the five test locations, an existing vapor well will be used as a monitoring well, or if the vapor well is located in the proper area, it may be used as an extraction well. In either case, the extraction well will be surrounded with a specific geometric pattern of zone of influence monitoring wells. In the native soil, beneath the sump-like material layer, air injection wells will also be installed. The depth of the perforations in the air injection and influence monitoring wells will be similar to those in the extraction wells (see Figures 3 and 4).

3. Example configurations of the extraction, injection and influence-monitoring wells for SVE in the fill and native soil layers are shown in Figures 3 and 4, respectively. The dimensions shown in each of these figures are estimated separately for the different depths of these two SVE test layers. In the native soil, four injection wells are arranged in a square geometry to determine the area potentially swept by the SVE test. This area, multiplied by the length of slotted interval of the extraction well, determines the subsurface volume subjected to extraction.

4. The zone of influence monitoring wells are placed at increasing distances in different directions (see Figures 3 and 4) to provide the ability of determining the maximum distance at which the extraction vacuum, can be detected. In general, zone of influence calculations indicate that the appropriate separation distances between the injection and monitoring wells are higher in the more permeable layers and smaller in less permeable layers. Based on the results of the first SVE test, the distance of the influence monitoring wells may need to be adjusted.

5. The SVE test will be started with a low vacuum (approximately 10 to 20 inches of water column (WC). The vacuum is then increased in steps, between which the vacuum in each of the zone of influence monitoring wells is measured. The goal is to obtain a mild vacuum (e.g., 0.1-inch water column [WC]) in the most distant well at a vacuum and flow rate that can be sustained by the blower. The blower will have a maximum suction capability of 100 to 120 inches WC. The discharge flow rate will be measured after it has stabilized.

11. A schematic of the typical SVE test equipment that is expected to be used is shown in Figure 7. The particulate

6. At the beginning of this test period, the concentrations of the following constituents will be measured in the extraction flow:

   - CH_4
   - TNMOCs
   - B_z
   - VC
   - Other VOCs
   - Oxygen (O_2)
   - Carbon Monoxide (CO_2)
   - Barometric pressure

   These concentrations will be measured initially and at various intervals, as shown in Table 2. The instruments or laboratory methods that will be used to measure these constituents are listed in Table 2.

7. The SVE test in the fill zone has an extraction well but no air injection wells because air will enter the top of the fill zone over the entire surface area. The SVE test in the native soil layer is deep enough to require air injection wells at the lateral boundary of the zone of influence through which air will be allowed to enter. When a vacuum is first detected in the zone of influence wells in the native soil layer. A pressure equilibrium will be achieved, prior to air injection wells being turned on. The air inspection wells will be turned on in a stepwise manner. This procedure will preserve the approximately square geometry of the zone of influence shown in Figure 3.

8. After pressure equilibrium is achieved at the maximum vacuum and flow fields, the SVE test will be run under constant conditions for up to one week. The rate at which each constituent is removed will be calculated in terms of mass per unit time (e.g., pounds per day) after each interval when concentrations and extraction flow rates are measured. The mass removal rates will be used to help determine when the test will be ended. Each test will be terminated at the end of one week if each of the mass removal rates for TNMOCs and methane is less than 0.1 pound per day. This rate is judged to be the threshold below which no significant benefit would be derived from extending the test. At the end of this period, the system will be sampled, and then shut off to allow measurement of the rate of recovery of the system, as shown in Table 2.

9. After completion of the SVE testing, the vapor extraction well (or monitoring well) will be isolated and its constituent concentration measured at various intervals, as indicated in Table 2. By following the vapor well's recovery period, the long-term effectiveness can be evaluated.

10. Schematics of the construction of typical SVE test wells are shown in Figures 5 and 6. The slotted interval will be adjusted to fit in the fill layer or the native soil layer. As indicated above, where possible, existing vapor monitoring wells will be used.

11. A schematic of the typical SVE test equipment that is expected to be used is shown in Figure 7. The particulate filter and water knockout is placed before the blower to prevent damage to its impeller blades. General specifications for the SVE test equipment are provided in Table 4. Figure 8 provides a P&ID for the proposed SVE unit. Table 5 gives an example of the SVE start-up procedure.

12. The water knockout will be checked frequently during the beginning of each SVE test to assure that water does not accumulate such that it is carried over into the blower. If necessary, a level control and pump will be set up in the water knockout to automate water removal. If water is extracted at such a high rate as to make the gas extraction insignificant or erratic, the SVE test in that location and layer will be cancelled or at least postponed.

13. For purposes of this testing, a South Coast Air Quality Management District (SCAQMD) permitted skid-mounted treatment unit will be used. Additionally, an SCAQMD permit to construct and operate under Rule 441 for research operations will be obtained. A copy of this rule is included in Appendix B.

3.2 CONTROLLED-VOLUME IN-SITU PIPE TEST

1. To measure the in-situ gas generation, a 24-inch pipe will be driven into the soil to isolate a known volume of soil and sump-like material as shown in Figure 9. Figure 10 provides a schematic of the in-situ pipe installation process. The

gas concentration generated by the sump-like material will then be measured above and below the sump-like material to allow calculation of the gas generation rate. Calculations indicate that a sludge thickness of 0.6 feet will produce sufficient methane to allow measurements of an increase of 5 ppmv, using current field instruments. TNMOCs will also be analyzed in this test.

2. The in-situ test will be conducted in close proximity to VW-45, which will be used for the first SVE test. The closeness of these two tests will allow the information derived to be more complementary in developing a picture of gas generation near C&E Die.

3. The test pipe is expected to be installed by a drill rig using a percussion drivehead. Some experimentation in installation may need to be conducted before a successful test pipe is fully installed.

4. As shown in Figure 5, each of the layers surrounding the sump-like material layer will be equipped with two sampling probes. One probe in each pair will be installed with its slots near the top of the layer (fill or native soil) and the other probe in each pair will have its slots near the bottom of the layer (a predetermined depth for the native soil). This arrangement will allow the measurement of gradients in each layer. The distance of the bottom probes above the sump-like material will be high enough to avoid having it fill with water above its slots. If water or liquids are encountered during installation of the probes, the liquids will be removed by pumping using a small peristaltic pump. The liquids will be collected and analyzed.

5. After installation of the pipe and the four probes an initial round of the following measurements will be made:

   - Pressure
   - Concentration:
     - Methane
     - TNMOCs
     - Benzene
     - Vinyl chloride
     - TCE
     - PCE
     - OtherVOCs

   This set of measurements will be repeated after one week, followed by monthly sampling for the first three months and then at six months intervals, as shown in Table 2.

3.3 LABORATORY TEST

1. Selected sump-like material samples will be collected from five wells drilled into the test areas shown in Figure 1. The soil samples will be taken from the sump-like material layer adjacent to its interface with the overlying fill material layer adjacent and its interface with the underlying native soil. It is expected that these locations will have the highest gas generation rates. These samples will be removed using a Shelby tube, sealed at the top and bottom, and transported to the University of Southern California (USC) Department of Chemical Engineering. The samples will be transported in coolers, purged with nitrogen to maintain an anaerobic environment. USC will conduct the laboratory test using the test apparatus as shown in Figure 11 which is designed to allow the measurement of gas generation rates under anaerobic conditions.

2. Samples of the soil will be analyzed for the following parameters at the beginning and end of each test.

   - Total moisture content
   - Bacterial populations
     - Heterotrophs
     - Methanogen
   - Total organic compounds
     - VOCs
   - Nitrogen and Phosphorus content
   - Hydrocarbon content
     - Hydrocarbon simulated distillation
     - VOCs

Procedures for the sampling and analysis of the materials are included in the existing Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) and will be adhered to in these tests. Standard Operating Procedures (SOPs) for the bacterial analyses are included in Appendix C. For activities not previously addressed in the SAP or QAPP, the SOP will include the relevant QA/QC information.

3. Gas generation rates will be measured under anaerobic conditions for two samples from each of the five areas over a period of 1 month. Each sample of approximately 2 liters in volume will be placed in a 3-liter glass jar. The soil sample will be transferred from the sampling tube to the test jar in an environmental chamber to avoid exposure to air.

4. Upon placement of the soil sample into the glass jar a predetermined atmosphere will be generated to fill the empty space in the jar. The test atmosphere will start as 100 percent nitrogen so that any appearance of other gases (e.g., CO_2, CH_4) will indicate the products of ongoing reactions such as anaerobic decomposition. Upon placement of the test atmosphere, the glass jars will be transferred into an incubator in order to maintain a constant temperature approximately equal to that in the sampled soil layer. This constant temperature will help maintain biodegradation conditions the same as in situ. The samples will be left undisturbed and in the dark to simulate conditions found in the WDI site itself. SOP TM 9.1 provides a more detailed description of the test procedures.

5. Gas generation will be monitored hourly initially by noting changes in total pressure through the aid of an attached side manometer containing an inert silicone oil (precautions will be taken to eliminate exposure of the manometer fluid to atmospheric air). The gas generation will then be followed daily for approximately 14 days, and then weekly until the testing it is completed, as shown in Table 2. A gas sample will be collected initially and at the completion of the test for analysis as indicated in Table 2. Interim gas samples may be collected at various intervals for analysis by USC for preliminary characterization.

6. It is estimated that the laboratory measurement technique will be sensitive to gas generation rates of 6.0×10^{-14} grams gas/(cm^3 waste/sec), which is over an order of magnitude less than generation rates calculated for the site.(1)

3.4 FLUX BOX MEASUREMENTS

1. The flux box shown in Figure 2 will be placed proximate to the controlled volume in situ pipe near VW-45. The flux box is then pressed approximately 1 inch into the soil, to achieve a secure seal. Surface soils will be packed by hand around the lip of the flux box to help maintain the seam.

2. The carrier gas will be utra pure air in compressed gas cylinders. A flowmeter and valve between the cylinder main valve will control the flow rate at a stable constant of approximately 1 liter per minute (lpm). The air from the cylinders has been purified enough to assure that the inlet concentration of each COC is essentially zero.

3. After the flow rate has been set and stabilized, a side flow of less than 1 lpm will be tapped off the outlet and pulled into a Summa canister. The Summa canister will be filled at a constant rate and sent to a commercial laboratory for analysis of the concentration of each COC.

4. The sample will be analyzed using EPA Methods 25.C (methane and TNMOC) and TO-14 (Volatile Organics), using the standard procedures for soil gas samples. An ambient air sample will also be collected and analyzed for comparative purposes.

4.0 EVALUATION/ANALYSIS OF TEST DATA

1. This section describes how the data derived from the tests will be used to calculate gas parameters.

4.1 EVALUATION OF SVE TEST DATA

1. During the SVE test the following data will be recorded:

   - Blower vacuum
   - Blower flow rate

(1) Calculated gas generation rate was forwarded to the U.S. EPA in the February 13, 1998 transmittal from TRC.

- Concentrations of:
  - CH_4
  - TNMOCs
  - Benzene
  - Vinyl chloride
  - VOCs
- Vacuum in each zone of influence monitoring well

2. These recorded data will be used to calculate the following gas parameters:
   - Extraction rate (mass per unit time) of each gas constituent
   - Extraction (influenced) volume of soil

3. Vacuum measured in the zone of influence monitoring wells will be used to calculate the area of influence. The volume of influence will be equal to the area of influence in each layer multiplied by the length of the slotted interval of the extraction well in the fill or in the native soil.

4. After the SVE system is turned off, the rate of increase of constituent concentrations will provide a measure of system "rebound" or recovery rate. During this "rebound" phase the following data will be recorded:
   - Concentration of:
     - CH_4
     - TNMOCs
     - Benzene
     - Vinyl chloride
     - VOCs
     - O_2 (as a measure of biological activity)
     - CO_2 (as a measure of biological activity)
   - Vacuum in each zone of influence monitoring well

   These parameters will be measured daily for the first three days after shutdown, as shown in Table 2. After the first three days, these parameters will be measured every three days for up to 14 days.

4.2 ANALYSIS OF CONTROLLED-VOLUME IN-SITU PIPE TEST DATA

1. Pressure gradients that are potentially measured in each layer surrounding the sump-like material layer can be used to calculate advective flux of soil gas from the following relationship:

$$F_{AMi} = \frac{k}{\mu\beta}\frac{dp_i}{dl} \qquad (1)$$

where F_{AMi} = molar flux of soil gas constituent i advecting down the pressure gradient (i.e., towards lower pressure in terms of moles per unit time per unit area perpendicular to the flow direction) [moles $L^{-2}T^{-1}$](g-mole $cm^{-2}sec^{-1}$).

k = intrinsic permeability of the porous medium [L^2(1)](cm^2(2)).

μ = absolute (dynamic) viscosity of the soil gas [$ML^{-1}T^{-1}$](centipoise).

ß = molar volume of an ideal gas [L^3mole^{-1}]($cm^3g\text{-}mole^{-1}$).

p_i = partial pressure of soil gas constituent i in pore spaces [$ML^{-1}T^{-2}$](cm of water column).

l = length or distance along pressure gradient [L](cm).

(1) Brackets [ ] give dimensions where L = length, T = time, M = mass, and Θ = temperature.
(2) Parentheses ( ) give example units.

The minus sign indicates that the direction of flow is opposite the pressure gradient, and the partial pressure of constituent i can be found from the total pressure and constituent concentration with the following relation:

$$p_i = pC_i^* \tag{2}$$

where p = total pressure of soil gas in pore spaces $[ML^{-1}T^{-2}]$(cm of water column).

C_i^* = concentration of constituent i, dimensionless $[\text{vol vol}^{-1}]$(ppbv).

2. Concentration gradients that are potentially measured in each layer surrounding the sump-like material layer can be used to calculate the diffusive flux of individual soil gas constituents. Diffusive volume flux can be calculated from the measured concentration gradient with the following relationship:

$$F_{DM_i} = \frac{E_a^{10/3}}{E_T^2} D_{ai} \frac{dC_i}{dl} \tag{3}$$

where F_{DMi} = molar flux of constituent i diffusing down the concentration gradient (i.e., towards lower concentration) in terms of moles per unit time per unit area perpendicular to the diffusive flow direction [moles $L^{-2}T^{-1}$](g-moles cm^{-2} sec^{-1}).

E_a = air filled porosity of porous medium $[L^3L^{-3}]$(-).

E_T = total porosity of the medium $[L^3L^{-3}]$(-).

D_{ai} = free-air diffusion coefficient of constituent i $[L^2T^{-1}]$(cm^2sec^{-1}).

C_i = concentration of constituent i in terms of moles per unit volume [mole L^{-3}] (g-mole cm^{-3}).

4.3 ANALYSIS OF LABORATORY MEASUREMENTS

1. The overall evolution of gas will be calculated from the pressure measurements through use of the ideal gas law as follows:

$$p_1V_1 = n_1R^*T \tag{4}$$
$$\text{and } p_2V_2 = n_2R^*T \tag{5}$$

where:

V = volume of gas in test jar $[L^3]$(cm^3).

n = number of moles of soil gas + inert atmosphere [moles] (g-moles).

R^* = universal gas constant of an ideal gas [$MT^{-2}L^2moles^{-1}\theta^{-1}$] (erg g-$mole^{-1}K^{-1}$).

T = absolute temperature of the test jar atmosphere [θ](°K).

Because the test jar contains a fixed volume, $V_1 = V_2 = V$. (6)

Equations 4, 5 and 6 are combined to develop the following relationship:

$$\frac{p_2}{p_1} = \frac{n_2}{n_1} \tag{7}$$

because the temperature is kept constant through use of an incubator.

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The ideal gas low is applicable both in the laboratory measurements, which are conducted at a total pressure of approximately one atmosphere and in the SVE tests, where the total pressure can be substantially lower than one atmosphere. Van der Waal's forces and associated correction factors to the ideal gas law would only be of consequence if experiments were conducted at total pressures greater than several atmospheres.

The temperature of the laboratory experiment will be controlled in an incubator at the long-term mean concentration of Los Angeles, which is approximately 64°F.

The total gas volume V consists of two parts: the volume of pore spaces in the soil sample and the volume of jar outside the soil sample:

$$V = V_j - \left[\frac{\Pi D s^2 h}{4}(1 - E_a)\right] \tag{8}$$

Where V_j = total volume of test jar $[L^3](cm^3)$.

D_s = diameter of soil sample $[L^3](cm)$.

h = height or length of soil sample [L](cm).

Equation 4 can be solved for the initial number of moles of soil gas plus inert atmosphere, and combined with Equation 8 as follows:

$$n_1 = \frac{p_1\left\{V_j - \left[\frac{\Pi D^2 s h}{4}(1 - E_a)\right]\right\}}{R * T} \tag{9}$$

where p_1 = 1 atmosphere to start $[ML^{-1}T^{-2}]$(cm of water column).

The change in number of moles can be found by combining Equations 7 and 9 as follows:

$$\Delta n = n_2 - n_1 = \left(\frac{p_2}{p_1} - 1\right) n_1$$

(10)

$$\Delta n = \frac{(p_2 - p_1)}{R \cdot T}\left\{V_j - \left[\frac{\Pi D h s^2 (1 - E_a)}{4}\right]\right\}$$

If the generation rate of gas is desired per unit time per unit weight (wet) of soil sample, then the following relation can be used:

$$G_M = \frac{\Delta n}{\Delta t\, V_s} \tag{11}$$

where G_M = soil gas generation rate (moles $L^{-3}T^{-1}$](g-mole $cm^{-3}sec^{-1}$).

Δt = time interval between measurements of pressure [T](sec).

V_s = overall volume of soil sample $[L^3](cm^3)$.

$$V_S = \frac{\Pi D s h^2}{4} \tag{12}$$

In terms of volume generation rate, the relation is:

$$G_V = \frac{\Delta n \beta}{\Delta t V_s} \tag{13}$$

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Combining Equations 10, 12 and 13, we get the following:

$$G_v = \frac{4\beta}{\Delta t\, \Pi Ds^2 h} \frac{(p_2 - p_1)}{R * T} \left\{ V_j - \left[\frac{\Pi Ds2h}{4} (1 - E_a) \right] \right\} \qquad (14)$$

4.4 ANALYSIS OF SURFACE FLUX MEASUREMENTS

1. SOP TM 9.3 contains the data analysis procedure for the surface flux measurements.

5.0 SCHEDULE OF TESTS

1. Figure 12 provides a schedule of activities. As indicated, approximately 23 weeks will be required to complete the field activities and reporting requirements after approval of the TM and supporting documents.

6.0 AMENDMENTS TO QAPP AND FSAP TO REFLECT MODIFICATIONS

1. No QAPP or FSAP modifications are required to complete the SVE technology evaluation or the in-situ gas generation tests, since these procedures have already been provided in the Remedial Design (RD) Investigative Workplan Appendix C. Table 6 provides a list of the various activities and the relevant QAPP/SAP sections. SOPs for various tasks including microbial analyses, flux box measurements and gas generation tests have been provided in Appendix C. These SOPs have been written to include the necessary QA/QC information to supplement the SAP/QAPP.

RPM APPROVAL STATUS:

BY: ______________________ **DATE:** ______________

_____ **Approved** _____ **Disapproved** _____ **Additional Information Required**

TABLE 1
SUMMARY OF SAMPLING AND ANALYSIS METHODS

CONSTITUENT OF CONCERN	RATIONALE FOR MONITORING	FIELD MONITORING METHOD	LABORATORY METHOD OF ANALYSIS	COMMENT
Chemical Parameters				
Methane (CH_4)	• Known Site Constituent	• Flame Ionization Detector (FID) • GEM 500 Landfill Gas Detector using Nondispersive Infrared (NDIR)	• EPA 25.C	• FID detects total organic compounds (TOC) expressed as methane. TNMOC can be removed with charcoal leaving CH_4. GEM-500 uses NDIR to measure CH_4 alone.
Total Non-Methane Organic Compounds (TNMOC)	• Includes a Large Number of Known Site Constituents	• FID • Photo Ionization Detector (PID)	• EPA 25.C	• FID used with and without charcoal, measures TOC, CH_4 and NMHC by difference. PID measures only NMHC.
Volatile Organic Compounds (VOCs)	• Known Site Constituents	• FID • PID	• TO-14	• Laboratory analysis of TNMOC.
Benzene (Bz)	• Known Site Constituent	• GC/FID	• TO-14	
Vinyl Chloride (VC)	• Known Site Constituent • ROD Constituent?	• No Accurate Field Method Available	• TO-14	
Oxygen (O_2)	• Used to Evaluate Soil Gas Conditions and Biological Disposal Conditions (including degree of anaerobic or aerobic conditions)	• GEM-500 Landfill Gas Detector using Electrochemical Cell	• Electrochemical Detector	
Carbon Dioxide (CO_2)	• Used to Evaluate Soil Gas Conditions and Biological Disposal Conditions	• GEM-500 Landfill Gas Detector using NDIR	• NDIR	
Hydrogen Sulfide (H_2S)	• Potential Anaerobic Sulfur Decomposition Product • Potential Health Concern	• Gold Film	• Electrolytic Conductivity Detector	• Not considered relevant, since has not been identified in non-vapor well sampling.

TRC

TABLE 1
SUMMARY OF SAMPLING AND ANALYSIS
(Continued)

CONSTITUENT OF CONCERN	RATIONALE FOR MONITORING	FIELD MONITORING METHOD	LABORATORY METHOD OF ANALYSIS	COMMENT
Chemical Parameters (Continued)				
Carbon Monoxide	• Potential Indicator of Subsurface Incomplete Combustion	• NDIR	• NDIR	• Not considered relevant, because not identified in routine vapor well sampling. • No source of incomplete combustion.
Physical Parameters				
Pressure	• Key Indicator of Gas Condition Including: - SVE Indicator of Zone of Influence - Laboratory Test Indicator of rate of Anaerobic Degradation	• Pressure Gauge/Magnahelic • Pitot Tube (differential pressure) Flow Meter	• None	
Flow Rate	• Needed Along with Concentration to Calculate Mass Removal Rate	• Pitot Tube • Magnahelic	• None	

TABLE 2

SAMPLING AND ANALYSIS SCHEDULE

TEST	FIELD PARAMETERS			LABORATORY SAMPLING	
	Parameter	Method	Frequency	Method	Frequency
SVE • Startup (0-8 hours)	• CH_4 • TNMOC • O_2 • CO_2 • Pressure/Flow • Benzene • Vinyl Chloride • Volatile Organics/TNMOC	• FID/PID • FID/PID • GEM 500 • GEM 500 • Magnahelic/Pitot tube • FID	Initially, then Hourly for the First 8 Hours	• EPA 25.C • EPA 25.C, TO-14 • Electrochemical Cell • NDIR • Field Only • TO-15 • TO-15 • TO-15	Every 2 Hours
• Initial Operations (8-48 hours)	• CH_4 • TNMOC • O_2 • CO_2 • Pressure/Flow • Benzene • Vinyl Chloride	• FID/PID • FID/PID • GEM 500 • GEM 500 • Magnahelic/Pitot tube	Every 4-6 Hours	• EPA 25.C • EPA 25.C, TO-14 • Electrochemical Cell • NDIR • Field Only • TO-14 • TO-14	Every 12 Hours
• Continued Operations (48 hours to Shutdown)	• CH_4 • TNMOC • O_2 • CO_2 • Pressure/Flow • Benzene • Vinyl Chloride • VOCs	• FID/PID • FID/PID • GEM 500 • GEM 500 • Magnahelic/Pitot tube -- -- --	Monitor Daily	• EPA 25.C • EPA 25.C, TO-15 • Electrochemical Cell • NDIR • Field Only • TO-14 • TO-14 • TO-14	Every 24 Hours (up to 7 days)
• Shutdown	• CH_4 • TNMOC • O_2 • CO_2 • Pressure/Flow • Benzene • Vinyl Chloride • VOCs	• FID/PID • FID/PID • GEM 500 • GEM 500 • Magnahelic/Pitot tube -- --	At Shutdown	• EPA 25.C • EPA 25.C, TO-15 • Electrochemical Cell • NDIR • Field Only • TO-14 • TO-14 • TO-14	One Sample (at shutdown)

TABLE 2

SAMPLING AND ANALYSIS SCHEDULE
(Continued)

TEST	FIELD PARAMETERS			LABORATORY SAMPLING	
	Parameter	Method	Frequency	Method	Frequency
• **SVE (cont'd.)** Post Shutdown	• CH_4 • TNMOC • O_2 • CO_2 • Pressure/Flow • Benzene • Vinyl Chloride • VOCs	• FID/PID • FID/PID • GEM 500 • GEM 500 • Magnahelic/Pitot Tube -- -- --	Daily First 3 Days; Monitor Every 3 Days for up to 14 Days	• EPA 25.C • EPA 25.C, TO-14 • Field Only • TO-14 • TO-14 • TO-14	Daily First 1-3 Days; Monitor every 3 Days for up to 14 Days
In-Situ Testing	• CH_4 • TNMOC • Pressure • Benzene • Vinyl Chloride • VOCs	• FID/PID • FID/PID • Magnahelic -- -- --	Initially Weekly Followed by Monthly	• EPA 25.C • EPA 25.C, TO-14 • Field Only • TO-14 • TO-14 • TO-14	Initially Weekly, Followed by Monthly
Laboratory Test	• CH_4 • TNMOC • Pressure • Benzene • Vinyl Chloride • VOCs • pH • Nutrients - Phosphorus - Nitrogen - Other • Moisture • Hydrocarbons • Bacterial - Heterotrophic - Methanogens - Total Anaerobic	-- -- • Micro Manometer -- -- -- -- -- -- -- -- 	Hourly, Day 1; Daily 14 Days; Followed Weekly Until Completion -- -- --	• EPA 25.C • EPA 25.C, TO-14 • TO-14 • TO-14 • TO-14 • Standard • Standard • Simulated Distillation • SOP TM 9.2	Initially, Followed by Sampling at Completion Initially Initially Initially and at Completion
Flux Testing	• CH_4 • TNMOC • Pressure • Benzene • Vinyl Chloride • VOC	• FID/PID • FID/PID • Magnahelic -- -- --	See SOP TM 9.3	• EPA 25.C • EPA 25.C • Field Only • TO-14 • TO-14 • TO-14	See SOP TM 9.3

TABLE 3

PROPOSED SVE TESTING LOCATIONS

AREA	EXISTING VAPOR WELL NO.(1)	MONITORING INTERVAL (ft. bgs)	PROPOSED SVE TEST INTERVAL	COMMENTS	PROPOSED TEST SEQUENCE
5	VW-51	5-8 13-18 23-30	√ (2) √	Well placed through impacted material at Brothers "considered high profile zone by EPA."	2
8	VW-49	5-10 15-18 25-30	√ √ √	Well outside of impacted area on edge of waste material. SVE trial of three zones.	1
7	VW-25	TBD TBD TBD	√ √ √	Currently screened through all zones (5' - 35'). Planned to be supplemented with a triple-completion vapor monitoring well.	3
2	VW-48	5-8 12-17 30-35	√ (3) √	Liquid present in well may be problematic. Area considered high profile by EPA because of liquids concerns. Activities may be implemented later in program, as additional field data is collected.(4)	4
2	VW-45	7.5-12.5 18.5-21.5 27-30	√ (2) √	Liquid present in well may be problematic. Area considered high profile by EPA because of liquids concerns. Activities may be implemented later in program, as additional field data is collected.	5

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(1) See Figure 1 for locations.
(2) This interval is excluded because its native air conductivity = 2E-10 cm/sec, which is too low to support SVE. Data is provided in Attachment B.
(3) This probe depth was excluded because it is completed in the waste zone.
(4) This area is considered analogous to PB/PW-2.

TABLE 4

SVE UNIT COMPONENT REQUIREMENTS
WASTE DISPOSAL, INC. SUPERFUND SITE

COMPONENT	REQUIREMENTS
System Features	
Nominal Capacity	=100 scfm
Daily destruction rate of NMHC	= 100 lb
Equivalent concentration	2,000 ppmv (as TCE)
Dimensions, trailer bed layout	10' L x 5' W
Weight (typical configuration)	1,800 lb
Electric requirements — Preheater	24V, 1Ø, 9 kW
Blower motor	5 hp, 240V, 1Ø, 28A (full load)
Controls	120V, 4A
Heat exchanger efficiency	55-60%
Vapor/liquid separator with explosion-proof float switch	
Catalytic Oxidizer	
Stainless steel process piping and heat exchanger	
Electric preheater	Flanged immersion type, Inconel sheath, and automatic inlet temperature control
Operating temperature (typical)	650-1000°F, high limit shutdown at 1100°F
Effluent discharge temperature	450-550°F
VOC destruction efficiency	NMHC 95-98%, Benzene >99%, Cl-VOC 95- >99%
Catalytic reactor	Flanged, removable, multi-stage, fixed bed
Catalyst volume — T2HDC	0.3 cubic feet, 20,000 GHSV @ 100 scfm
#8199	0.5 cubic feet, 12,000 GHSV @ 100 scfm
Approximate weight	1,000 lb
Dimension, including clearances	90" L x 30" W x 33" H
Blower	
Type	Rotary Positive Displacement
Make and model	MD Pneumatics, model 3206
Flow vacuum	100 scfm @ 6" Hg
Drive motor	5 hp, 240V, 1Ø, 28A (full load)
Approximate weight	600 lb
Instruments & Process Controls	
• Vacuum indicator, inches H_2O	–
• Blower discharge temperature indicator	–
• Process gas flow rate indicator, scfm	–
• Flow control from 30 to 100 scfm by gas recirc	–
• Low flow pressure limit switch	–
• Manual dilution air valve with filter/muffler	–
• Temperature indicators at catalyst entry, interstage & exit	–
• Temperature indicator and controller w/autotune for reactor temperature control	–
• High & low temperature shutdown	–
• Filter/coalescer in vapor/liquid separator	–
• Automatic quench air valve	–
Options Included	
• Auto restart	
• Autodialer	
• Hour meter	
• Sound enclosure for Blower	
• Circular chart recorder	
• Trailer mounted	
Particulate Filter	Removal of > 200mm particles
Wells	
• Fixation wells	Installed and screened such that appropriate subsurface zones
• Vacuum monitoring/air inlet wells	Are treated and/or monitored

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TABLE 5

EXAMPLE
SVE START UP CHECKLIST

	CHECKED BY	COMMENT
Start Up Checks		
• Power Source Verified		
• Water Knock Out Clean/Clear		
• Particulate Filter Installed		
• Pressure/Vacuum Indicators		
- Installed		
- Calibrated		
• Temperature Gauges		
- Installed/Operation		
- Calibrated		
• Sample Ports Operational		
• Piping/Connections		
- Visual Inspection/Leak Identification		
• Gas Treatment System		
- Makeup Gas Supply Fill		
- Instrumentation Operational/Calibrated		
Start Up Procedure		
• Start Up		
- Energize Blower/Treatment Unit		
- Set Initial Flow at 10 scfm		
- Check System for Blockages, Leaks		
- Test Operational Controls and Valves		
- Test Well Controls and Valves		
- Increase Blower Rate Slowly to Maximum ($\simeq$ 100 scfm) and Check Connections/Operations		
Operations		
• Reduce Blower Flow to 20 scfm		
• Open Vapor Well Valve		
• Allow System to Equilibrate		
• Conduct Start Up Sampling (as necessary)		
• Monitor Zone of Influence Wells		
• Monitor Off Gas Treatment Effluent Gas		
• Gradually Increase Blower Rate to Optimum Level (flow versus vacuum) (if necessary, add bleed in air prior to blower)		
• Record Data from SVE Unit and Monitoring Well Probes		
• Collect Samples and Monitor Conditions		
• Monitor Water Knock Out Unit, Drain if Necessary, Record Volume		
• Monitor Particulate Filter, Clean if Necessary		

TABLE 6
QA/QC REFERENCES

ACTIVITY	PROCEDURE/SOP	GENERAL SAP REFERENCE(1)	GENERAL QUALITY ASSURANCE PROJECT PLAN REFERENCE(2)	COMMENT
SVE TESTING				
• Field Parameters				
- Methane	SOP-K(3)	A.5(3)	A.5(3)	DQO Level/Field Instrumentation
- TNMOC	SOP-K	A.5	A.5	Existing QAPP Requirements Apply
- Oxygen	SOP-K	A.5	A.5	
- Carbon Dioxide	SOP-K	A.5	A.5	
- Pressure/Flow	SOP-K	A.5	A.5	
• Laboratory Parameters				
- Methane	A.4.3(3)	A.5.1.2(3)	A.5.1.2(3)	Existing QAPP Requirements will be Applicable( ) see:
- TNMOC	A.4.3	A.5.1.2	A.5.1.2	Table B.2 (Data Quality Objectives)
- Benzene	A.4.3	A.5.1.2	A.5.1.2	Table B.4 (Soil Gas Quality Control Objectives)
- Vinyl Chloride	A.4.3	A.5.1.2	A.5.1.2	Table B.7 (Laboratory Quality Assurance Requirements)
- Volatile Organic Components	A.4.3	A.5.1.2	A.5.1.2	Table B.8 (Field Collection Quality Assurance Requirements)

(1) This provides a general reference to the relevant Sampling and Analysis Plan Section.
(2) This provides a general reference to the relevant Quality Assurance Project Plan Section.
(3) Remedial Design Activities Workplan, TRC Environmental Solutions, Inc., 1997.

TABLE 6
(Continued)

ACTIVITY	PROCEDURE/SOP	GENERAL SAP REFERENCE(1)	GENERAL QUALITY ASSURANCE PROJECT PLAN REFERENCE(2)	COMMENT
Flux Testing				
• Field Parameters				
- Methane	SOP-TM9.3	A.5(3)	B.5.2(3)	DQO Level/-2 Field Instrumentation
- TNMOC	SOP-TM9.3	A.5	B.5.2	*Existing QAPP Requirements Apply*
- Pressure/Flow	SOP-TM9.3	A.5	B.5.2	
• Laboratory Parameters				
- Methane	A.4.3	A.5.1.2	B.5.2.3(3)	Existing QAPP Requirements will be Applicable(3) see:
- TNMOC	A.4.3	A.5.1.2	B.5.2.3	Table B.2 (Data Quality Objectives)
- Benzene	A.4.3	A.5.1.2	B.5.2.3	Table B.4 (Soil Gas Quality Control Objectives)
- Vinyl Chloride	A.4.3	A.5.1.2	B.5.2.3	Table B.7 (Laboratory Quality Assurance Requirements)
- Volatile Organic Components	A.4.3	A.5.1.2	B.5.2.3	Table B.8 (Field Collection Quality Assurance Requirements)

(1) *This provides a general reference to the relevant Sampling and Analysis Plan Section.*

(2) This provides a general reference to the relevant Quality Assurance Project Plan Section.

(3) Remedial Design Activities Workplan, TRC Environmental Solutions, Inc., 1997.

TABLE 6
(Continued)

ACTIVITY	PROCEDURE/SOP	GENERAL SAP REFERENCE[1]	GENERAL QUALITY ASSURANCE PROJECT PLAN REFERENCE[2]	COMMENT
In-Situ Testing				
• Field Parameters				
- Methane	SOP-K[3]	A.5[3]	B.5.2[3]	DQO Level/Field Institute
- TNMOC	SOP-K	A.5[3]	B.5.2[3]	Existing QAPP Regulations Apply
- Oxygen	SOP-K	A.5[3]	B.5.2[3]	
• Laboratory Parameters				
- Methane	A.4.3[3]	A.5.1.2[3]	B.5.2.3[3]	Existing QAPP Regulations will be Applicable( )
- TNMOC	A.4.3	A.5.1.2[3]	B.5.2.3[3]	Table B.2 (DQOs)
- Benzene	A.4.3	A.5.1.2[3]	B.5.2.3[3]	Table B.4 (Soil Gas Quality Control Objective)
- Vinyl Chloride	A.4.3	A.5.1.2[3]	B.5.2.3[3]	Table B.7 (Laboratory Quality Assurance Requirements)
- VOCs	A.4.3	A.5.1.2[3]	B.5.2.3[3]	Table B.8 (Field Collection Quality Assurance Requirements)
Laboratory Gas Generation Test				
• Laboratory Parameters				
- Methane	A.4.3[3]	A.5.1.2[3]	B.5.2[3]	Laboratory Pressure Measurements, Bacterial Counts and SEM/Fluorescence Microscopy will be DQO Level 1 Activities
- TNMOC	A.4.3	A.5.1.2	B.5.2	Remaining Parameters will be Performed in Accordance with the General SAP/QAPP Requirements of the Remedial Design Activities Workplan and the Revised Supplemental Field Sampling and Analysis Plan and the Revised Supplemental Quality Assurance Project Plan.
- Benzene	A.4.3	A.5.1.2	B.5.2	
- Vinyl Chloride	A.4.3	A.5.1.2	B.5.2	
- VOCs	A.4.3	A.5.1.2	B.5.2	
- Nutrients	--	A.4[4]	B.5.1.4[4]	
- Moisture	--	A.4[4]	B.5.1.4[4]	
- pH	EPA 9045	A.4[4]	B.5.1.4[4]	
- Bacterial Counts	SOP-TM9.2		B.5.1.4[4]	
- SEM/Fluorscoping	SOP-TM9.2		N/A	
- Hydrocarbons	--			
• Field Parameters				
- Pressure	SOP-TM9.2	A.5[3]	B.5.2	

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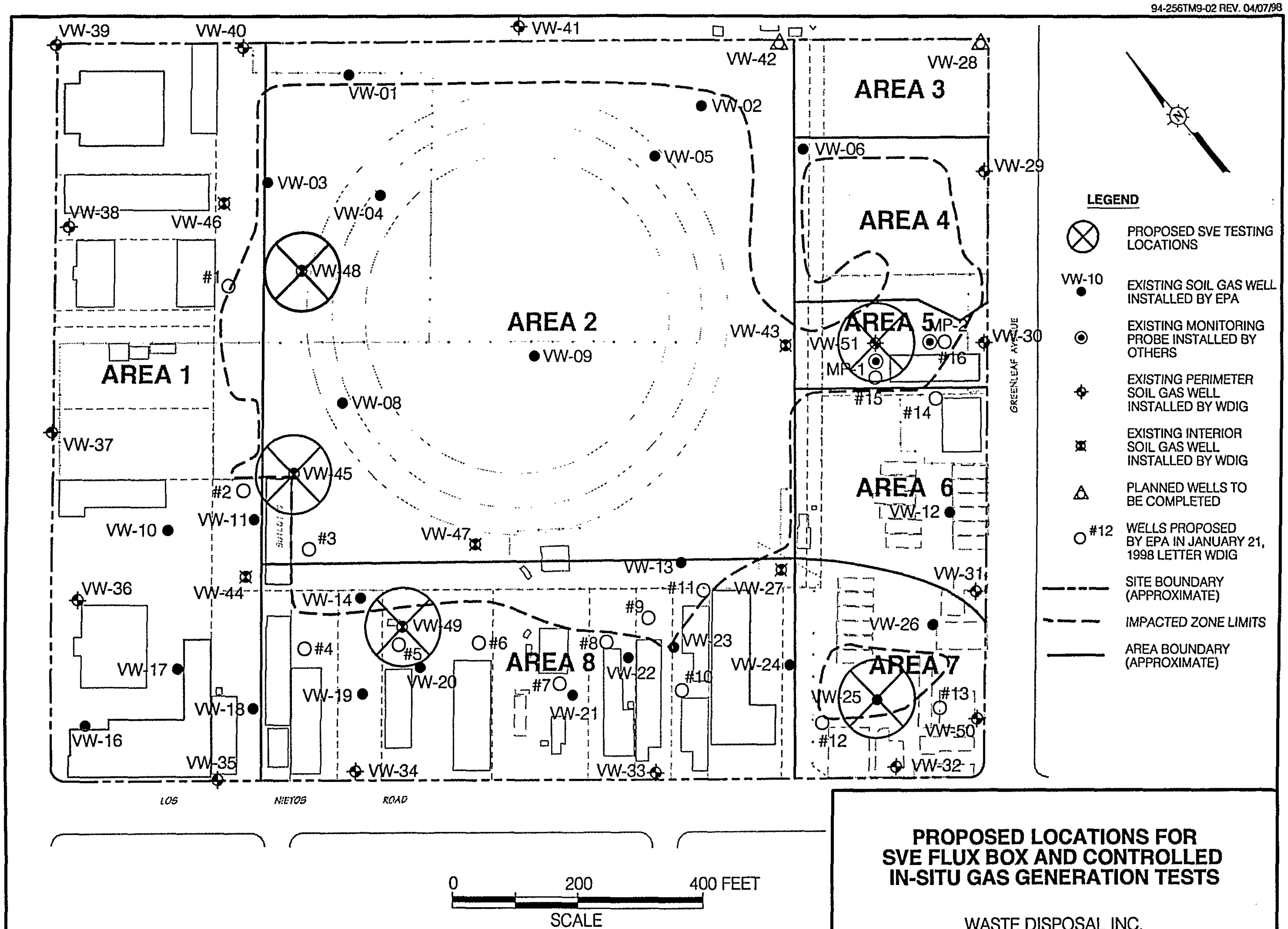
(1) This provides a general reference to the relevant Sampling and Analysis Plan Section.
(2) This provides a general reference to the relevant Quality Assurance Project Plan Section.
(3) Remedial Design Activities Workplan, TRC Environmental Solutions, Inc. 1997.
(4) Revised Supplemental Field Sampling Plan, 1997.
(5) Revised Supplemental Quality Assurance Project Plan, 1997.

TRC

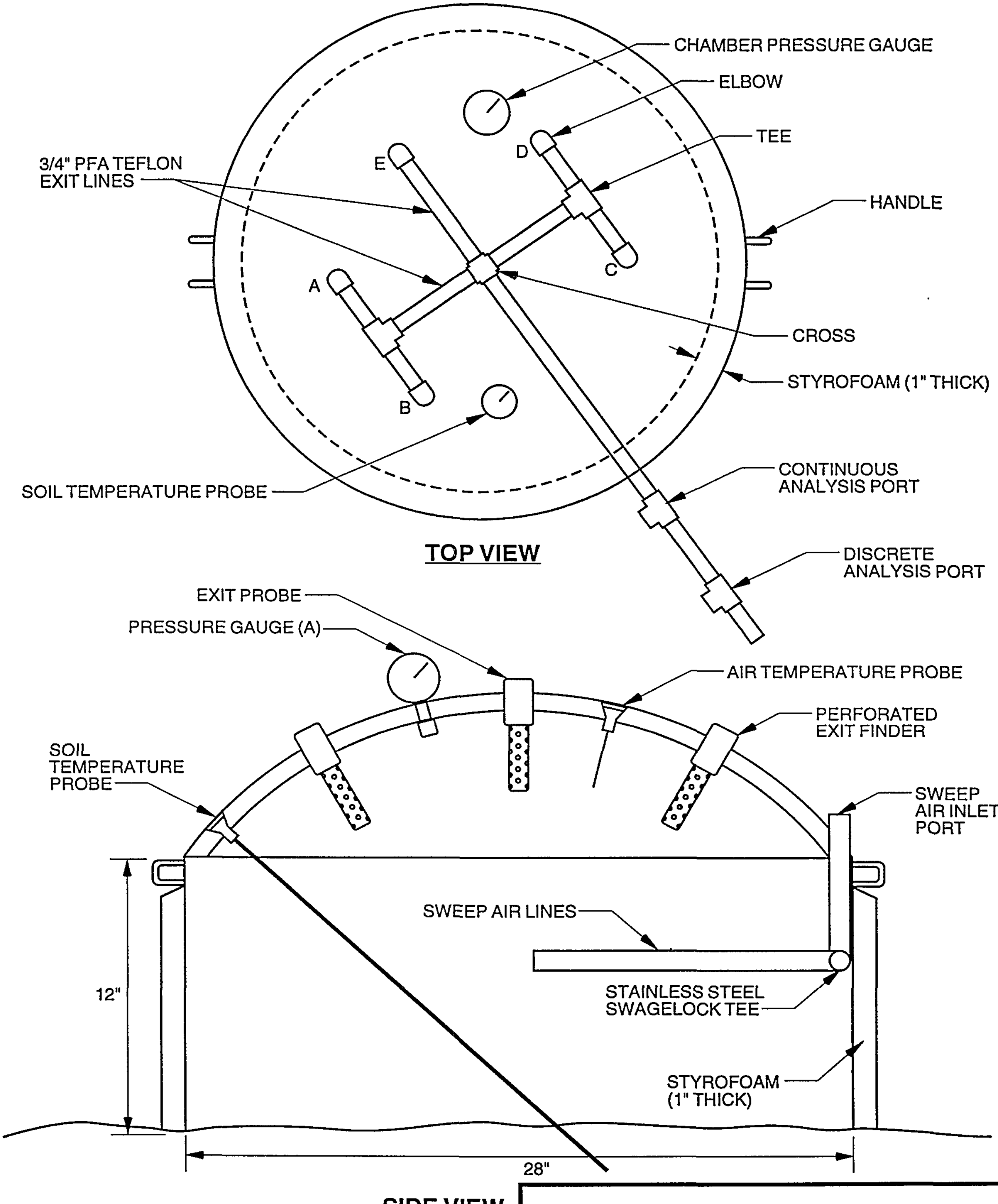


PROPOSED LOCATIONS FOR SVE FLUX BOX AND CONTROLLED IN-SITU GAS GENERATION TESTS

WASTE DISPOSAL INC.
SANTE FE SPRINGS, CALIFORNIA

TRC

FIGURE 1

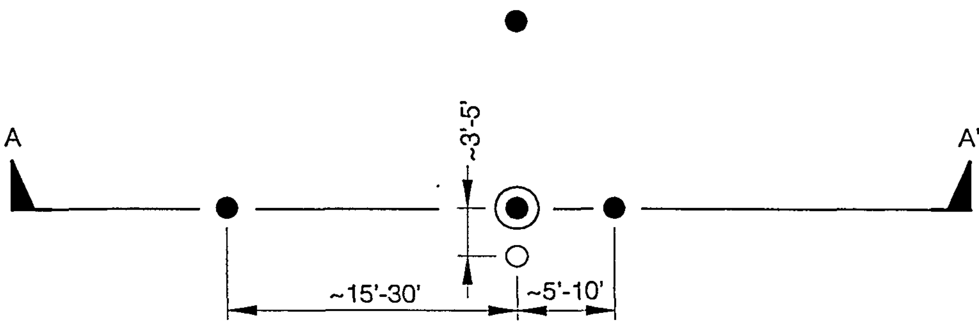


FLUX CHAMBER

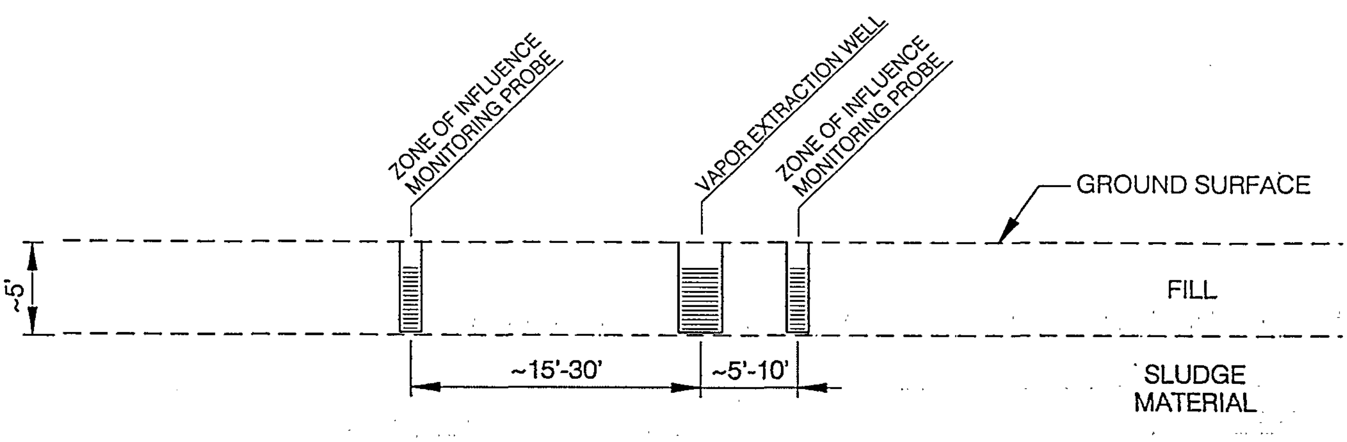
WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | FIGURE 2

94-256TM9-07 04/14/98



PLAN VIEW



CROSS SECTION A-A'

0 20 40 FEET

SCALE

LEGEND

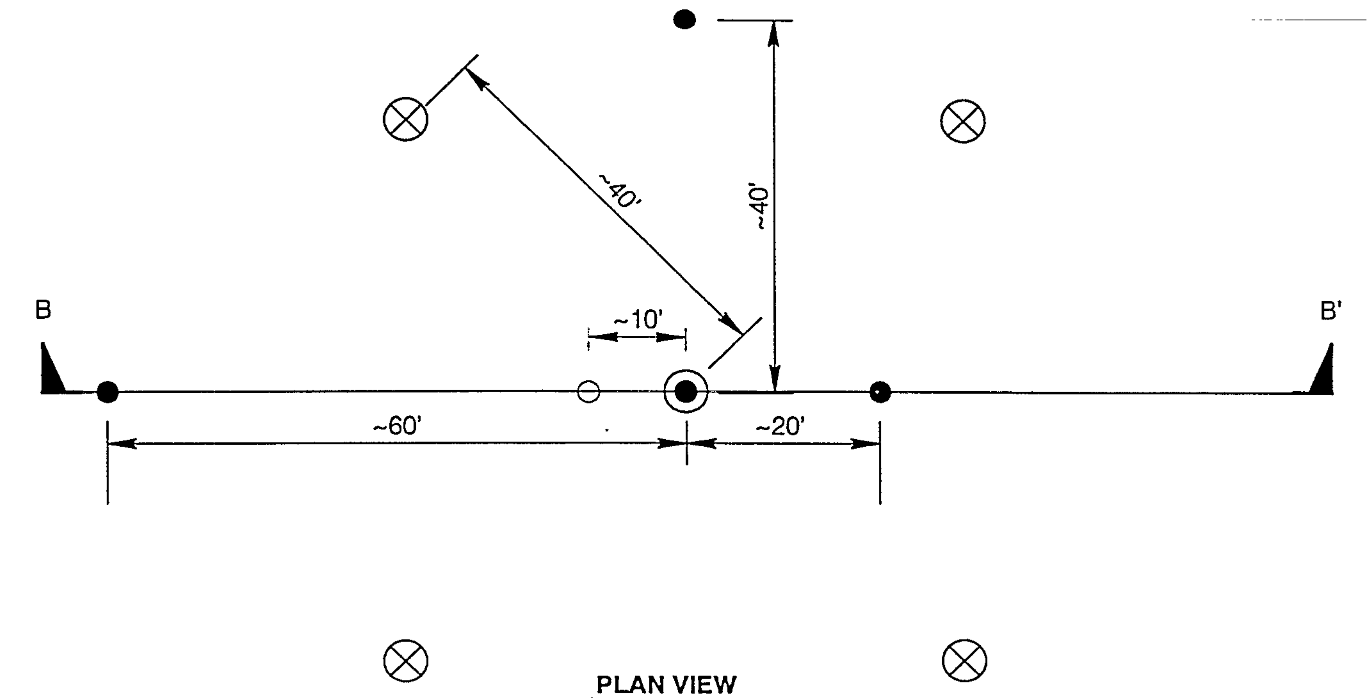
- VAPOR EXTRACTION WELL
- AIR INJECTION VENT
- ZONE OF INFLUENCE MONITORING PROBE
- VAPOR MONITORING PROBE

EXAMPLE SVE TEST WELL CONFIGURATION IN FILL LAYER ABOVE THE SLUDGE MATERIAL LAYER

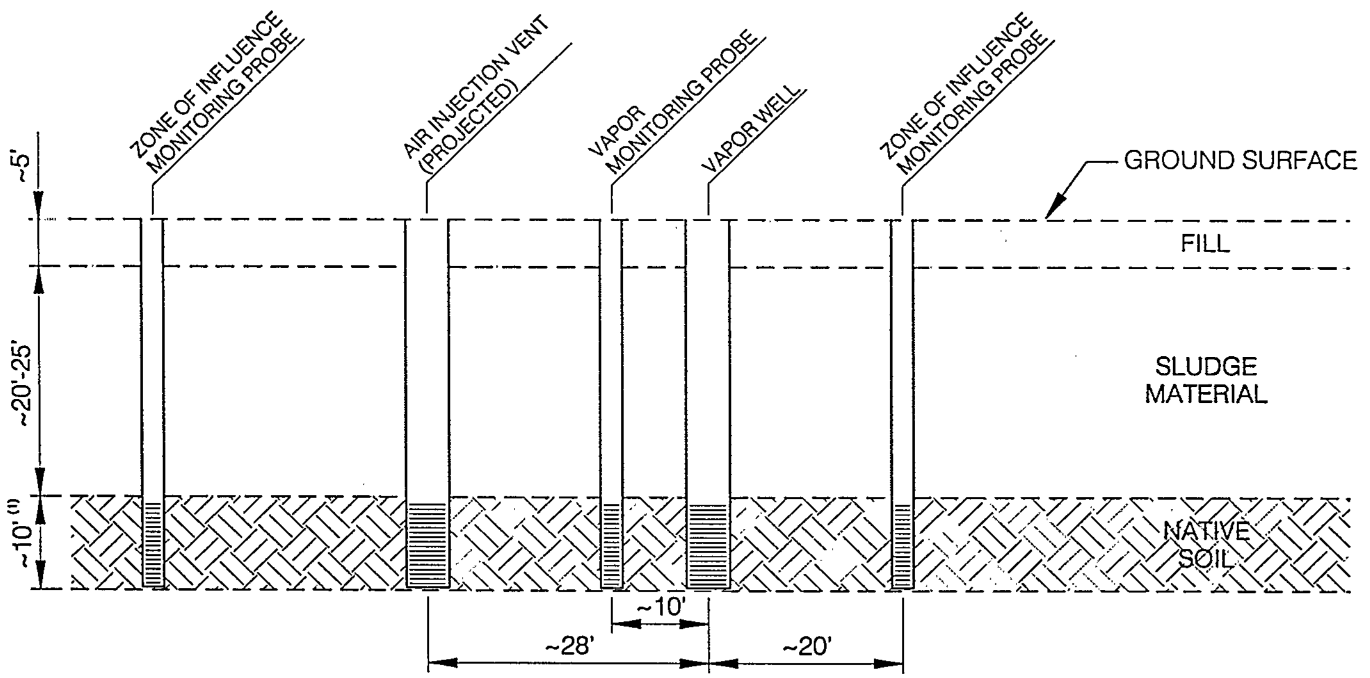
WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC	FIGURE 3

94-256TM9-03 04/14/98



PLAN VIEW



SECTION B-B'

LEGEND

- ◉ VAPOR WELL
- ⊗ AIR INJECTION VENT
- ● ZONE OF INFLUENCE MONITORING PROBE
- ○ VAPOR MONITORING PROBE

(1) ACTUAL CONFIGURATION TO BE DETERMINED BASED ON FIELD DATA, IN CONCURRENCE WITH EPA.

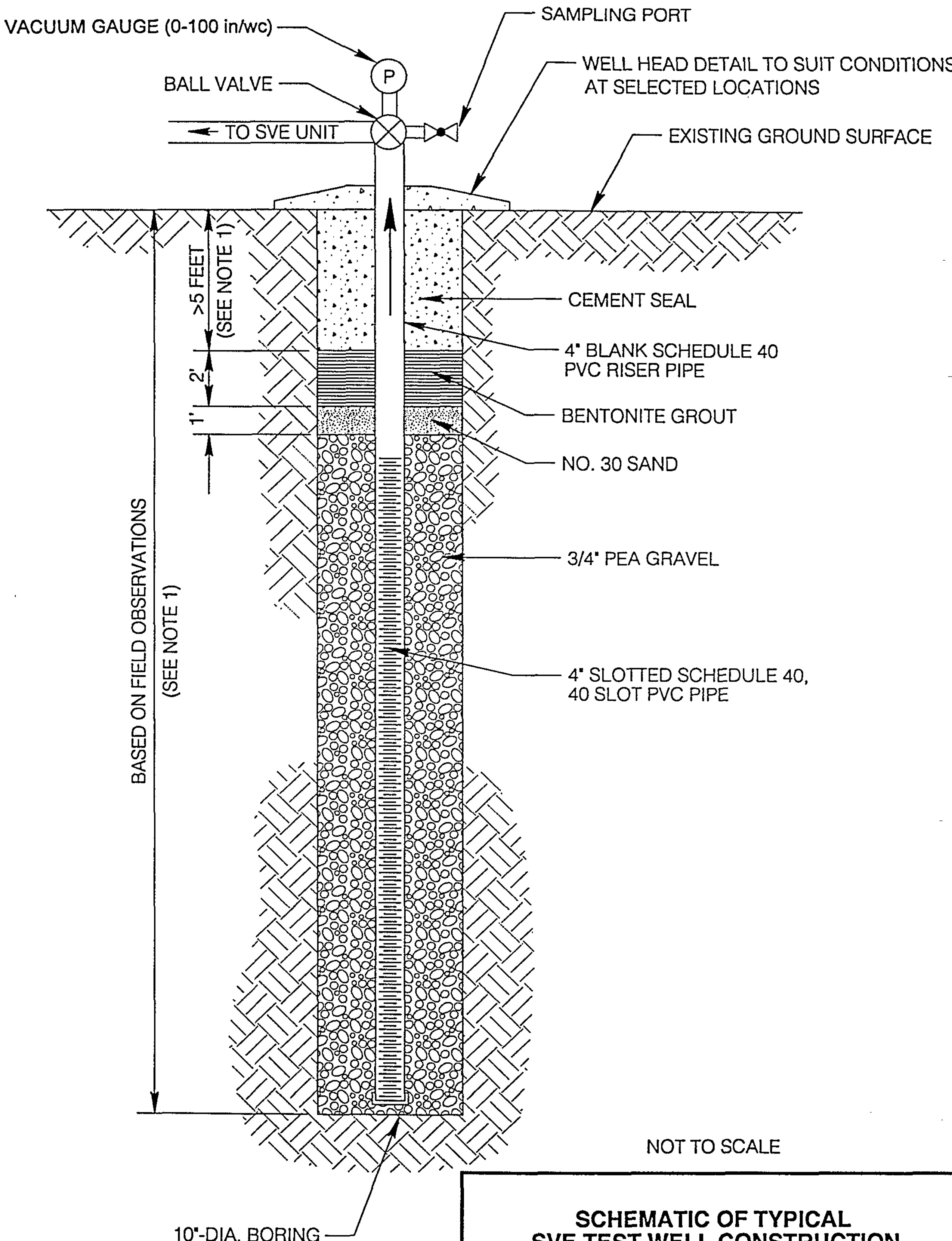
NOT TO SCALE

EXAMPLE SVE TEST WELL CONFIGURATION IN THE NATIVE SOIL BENEATH THE SLUDGE MATERIAL LAYER

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | **FIGURE 4**

94-256TM9-04 04/14/98



NOT TO SCALE

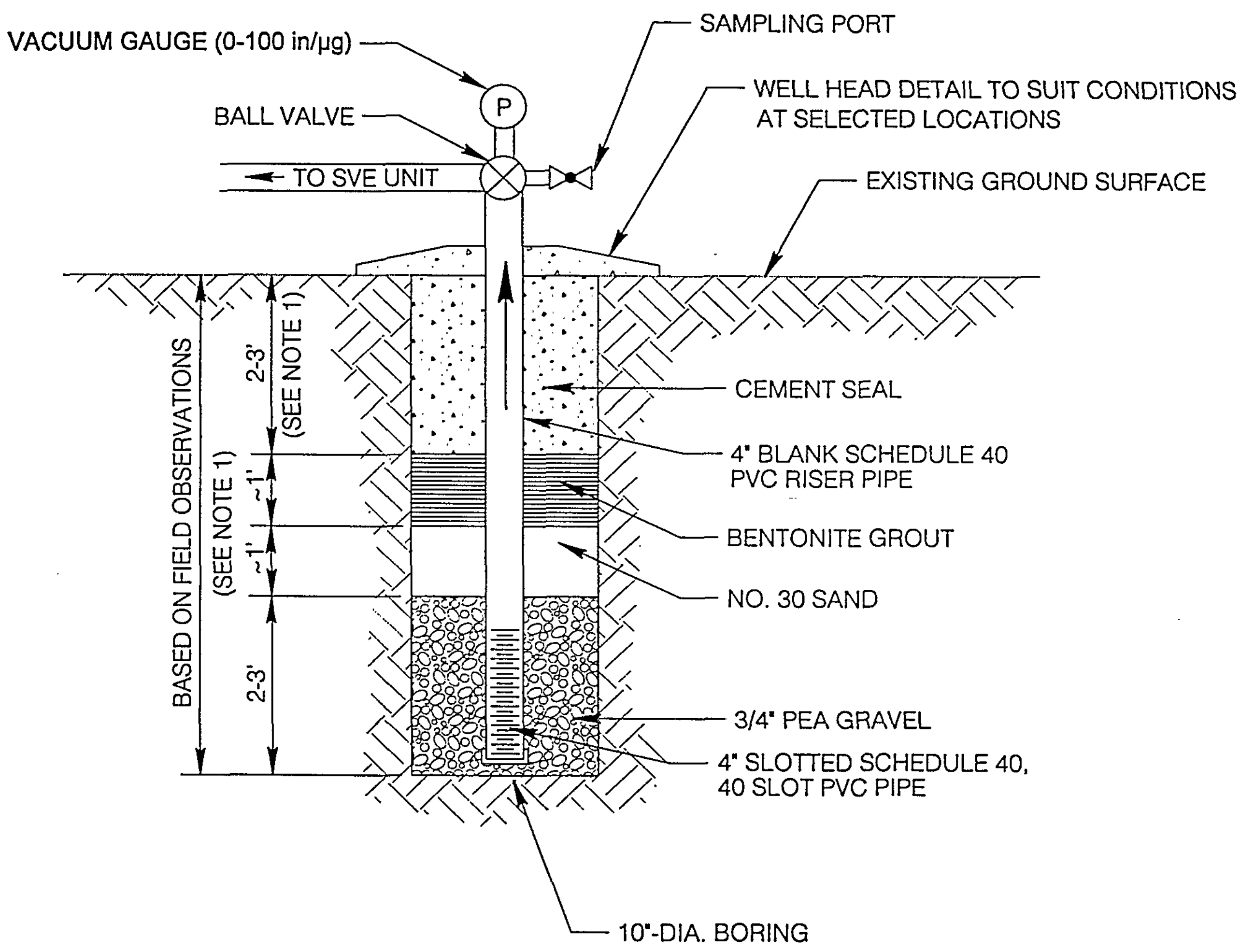
(1) THE DEPTH OF THIS SEAL AND SCREENED INTERVAL WILL BE DETERMINED ON A WELL BY WELL BASIS BASED ON ENCOUNTERED LITHOLOGY.

SCHEMATIC OF TYPICAL SVE TEST WELL CONSTRUCTION NATIVE SOIL

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC	**FIGURE 5**

94-256TM9-08 04/14/98



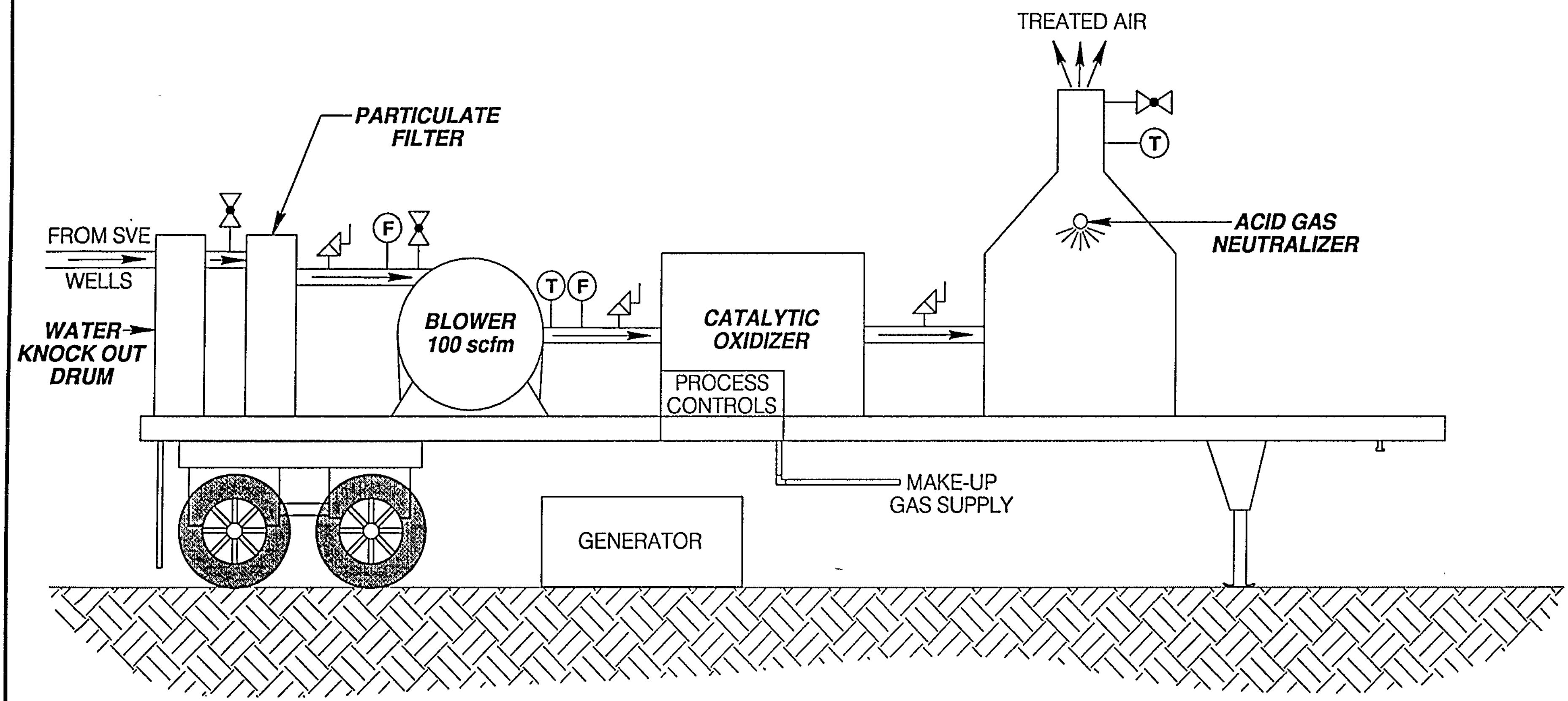
NOT TO SCALE

(1) THE DEPTH OF THIS SEAL AND SCREENED INTERVAL WILL BE DETERMINED ON A WELL BY WELL BASIS BASED ON ENCOUNTERED LITHOLOGY.

SCHEMATIC OF TYPICAL SVE TEST WELL CONSTRUCTION SHALLOW SOILS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | **FIGURE 6**



NOT TO SCALE

LEGEND

(F) FLOWMETER

(T) TEMPERATURE PROBE

SAMPLE PORT

PRESSURE RELIEF VALVE

NOTE: FOR SPECIFICATIONS SEE TABLE 2.

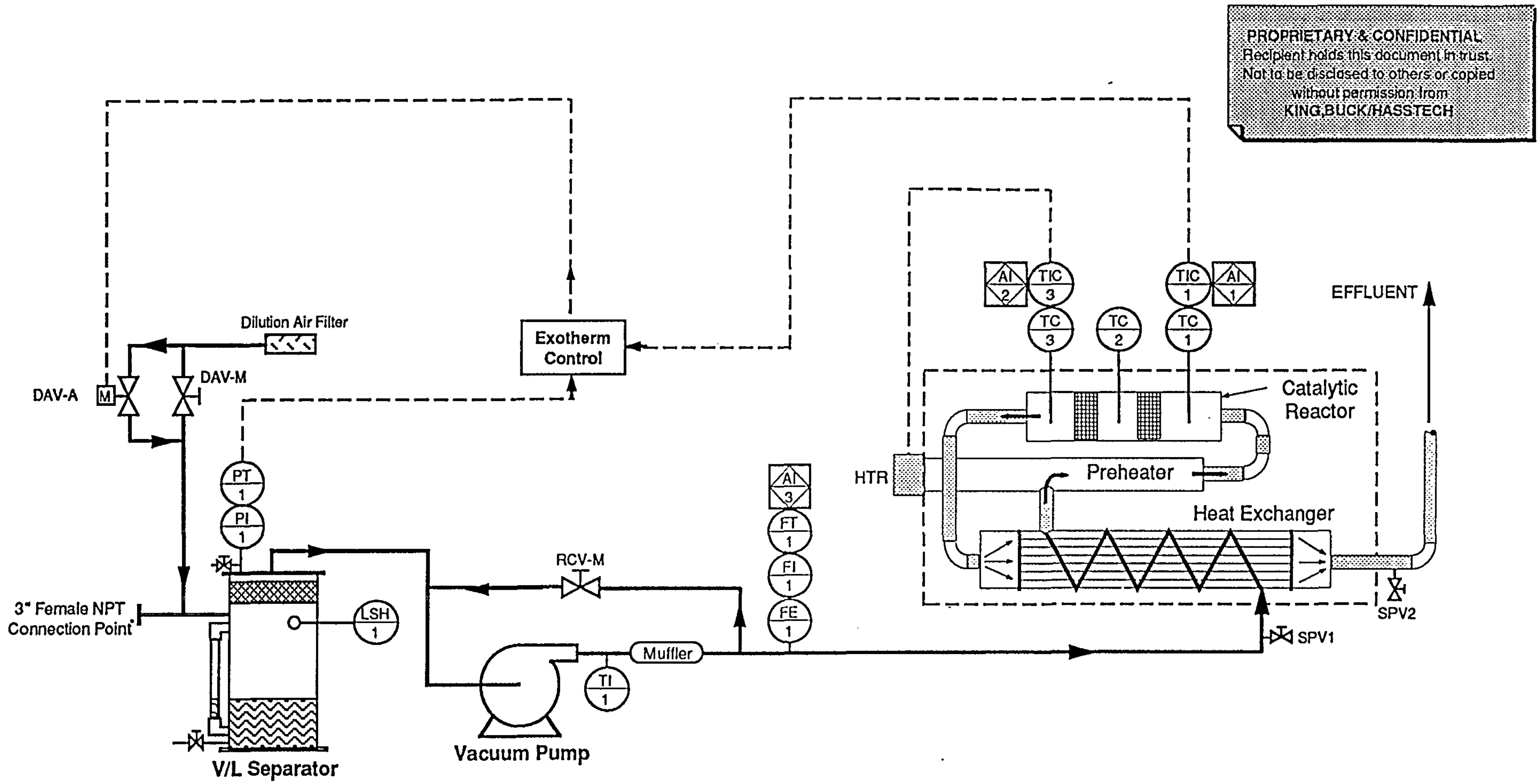
SCHEMATIC OF TYPICAL SVE TEST EQUIPMENT

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 7

94-256TM9 REV. 4/7/98



Legend:

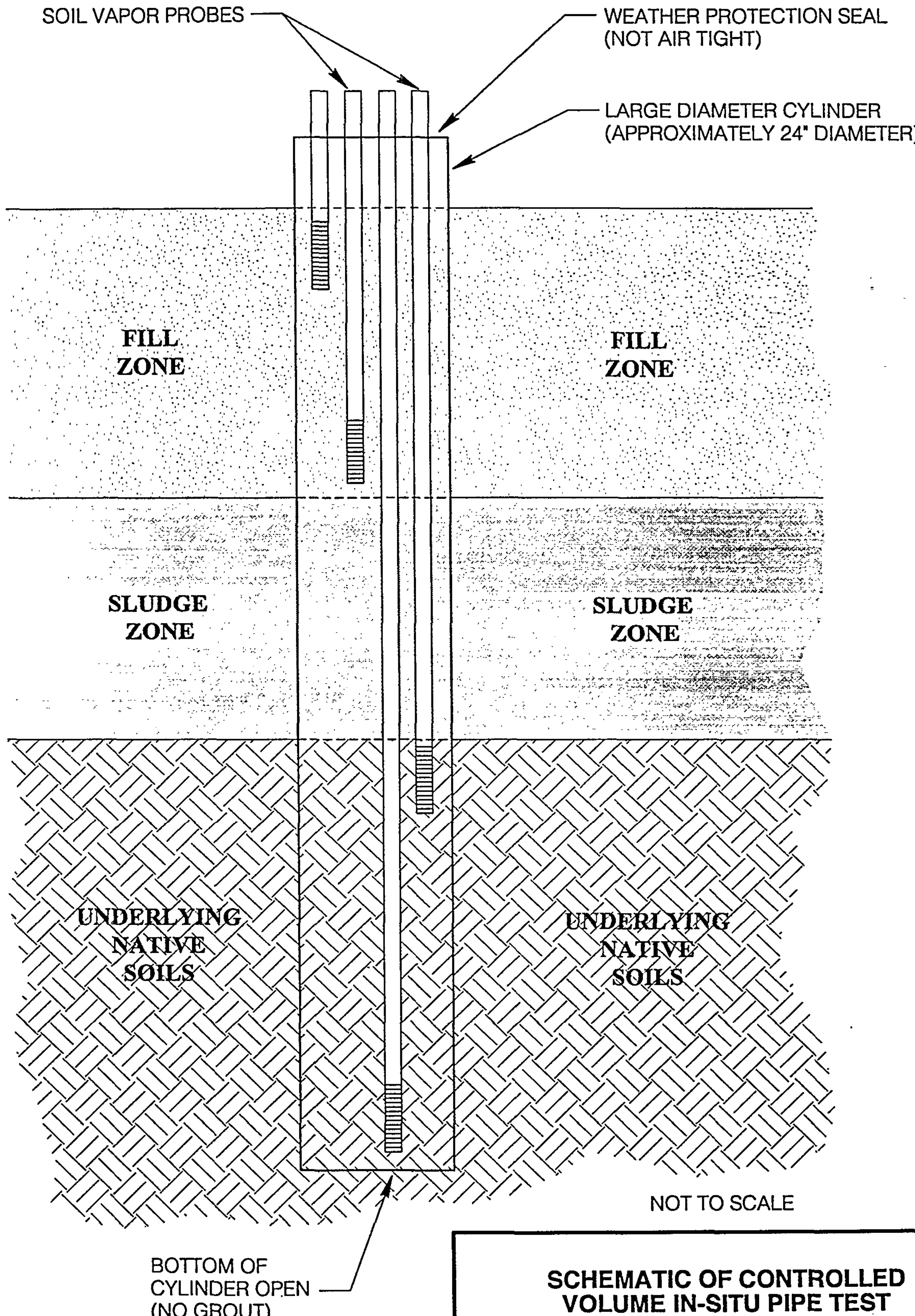
AI Analog Input to Chart Recorder
DAV-A Dilution Air Control Valve - Automatic
DAV-M Dilution Air Control Valve - Manual
FI Flow Indicator
FS Flow Sensor
FT Flow Transmitter
HTR Heater
Hx Heat Exchanger
LSH Level Switch High
M Actuator Motor
PI Pressure Indicator
PT Pressure Transmitter
RCV-M Recirculation Control Valve - Manual
SPV1 Sample Port Valve - Influent
SPV2 Sample Port Valve - Effluent
TI Temperature Indicator
TC Thermocouple
TIC Temperature Indicating Controller

PIPING AND INSTRUMENTATION DIAGRAM
CATALYTIC OXIDIZER UNIT

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | **FIGURE 8**

94-256TM9-06 REV. 04/14/98



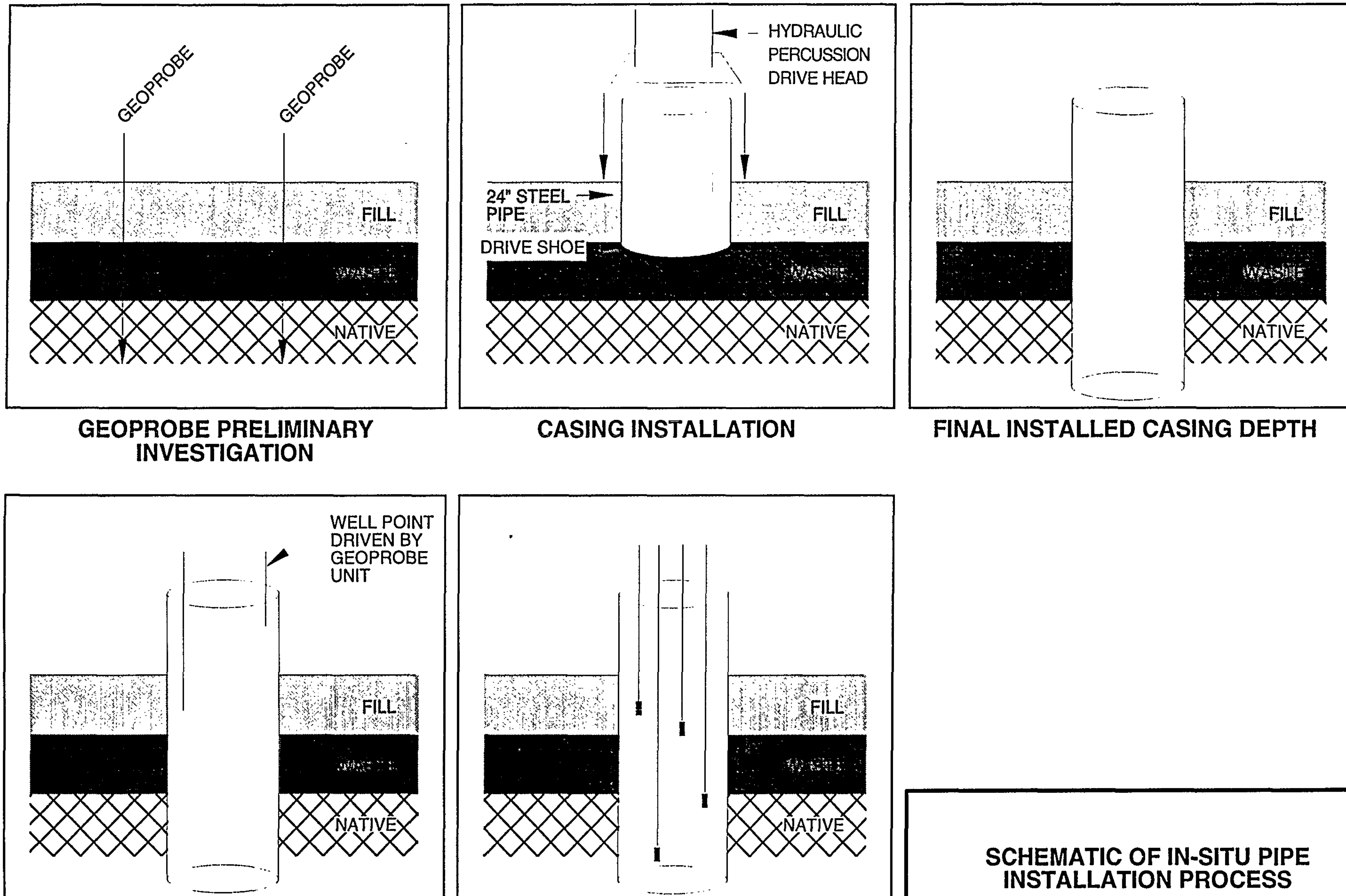
SCHEMATIC OF CONTROLLED VOLUME IN-SITU PIPE TEST WELL CONSTRUCTION

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 9

94-256TM9-10 REV.04/14/98



GEOPROBE PRELIMINARY INVESTIGATION

CASING INSTALLATION

FINAL INSTALLED CASING DEPTH

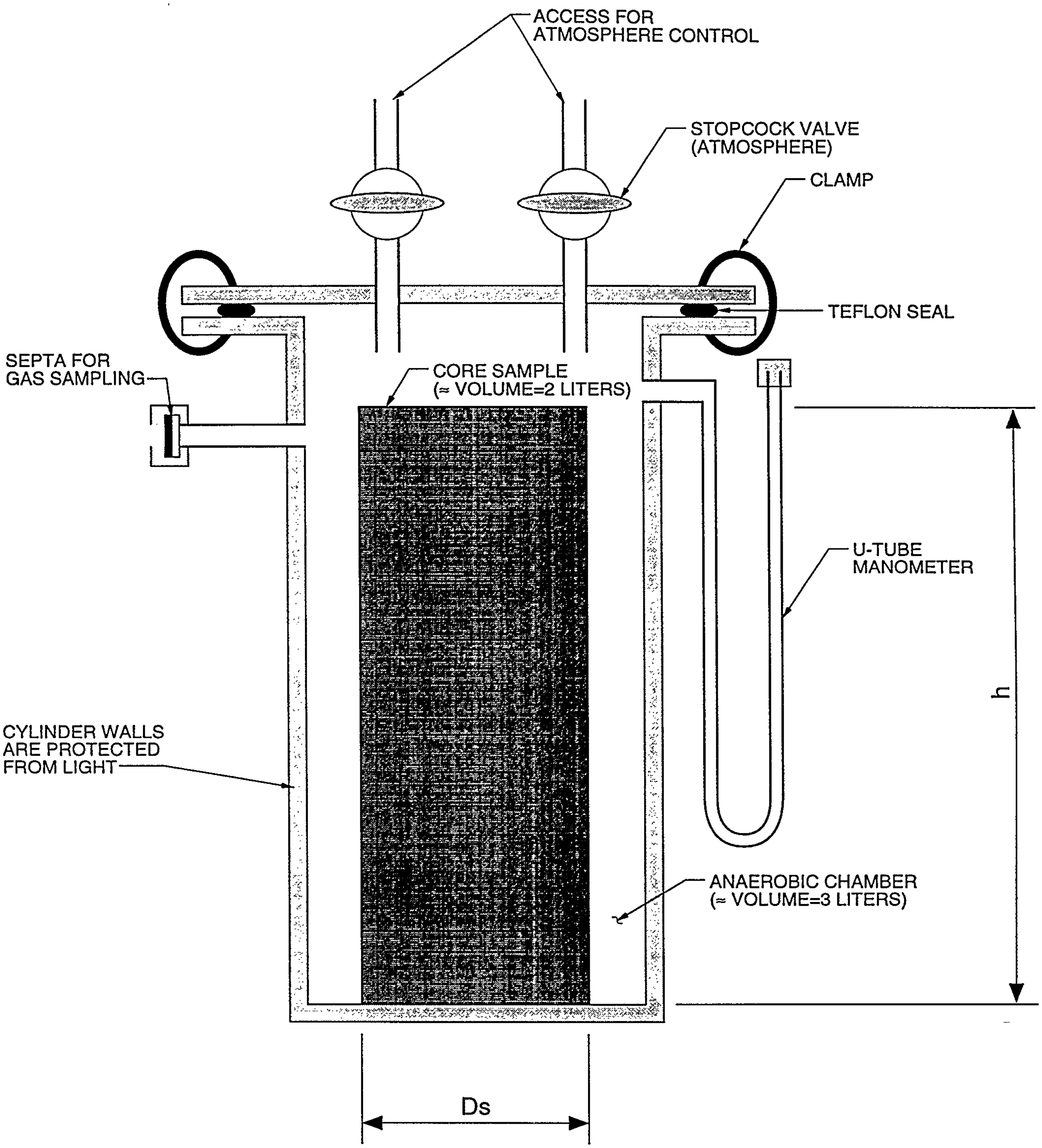
MONITORING POINT INSTALLATION

FINAL IN-SITU TEST CONFIGURATION

SCHEMATIC OF IN-SITU PIPE INSTALLATION PROCESS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC	FIGURE 10



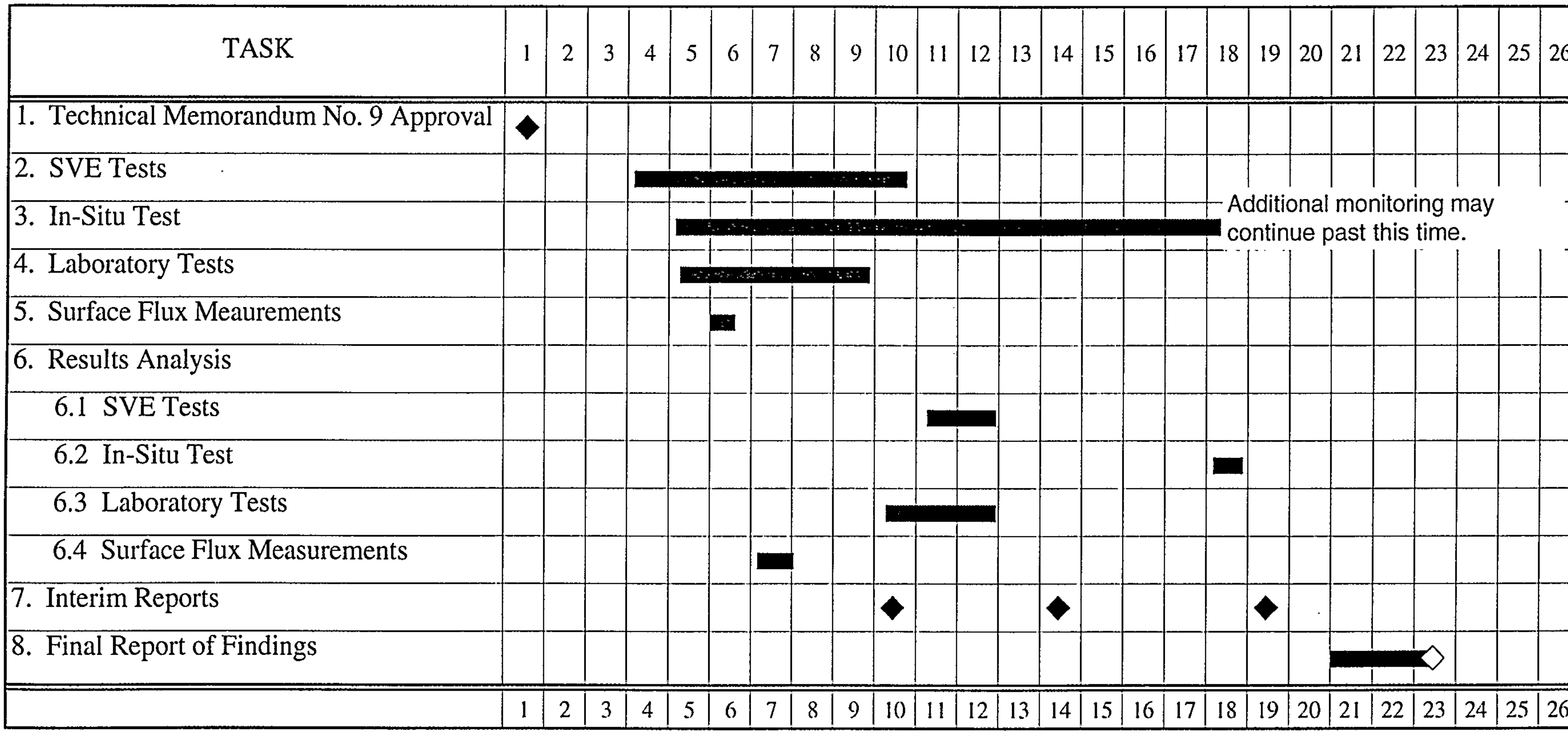
SCHEMATIC OF LABORATORY TEST EQUIPMENT

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC	**FIGURE 11**

FIGURE 12

GAS PARAMETER TEST SCHEDULE (IN WEEKS)
WASTE DISPOSAL, INC. SUPERFUND SITE



Rev. 2.0, 4/14/98

APPENDIX A

LIST OF EXISTING VAPOR WELLS, CONSTRUCTION DATA, AND LATEST CONSTITUENTS CONCENTRATIONS MEASURED
(TO BE PROVIDED)

APPENDIX B

SCAQMD RULE 441

TRC

(Adopted May 7, 1976)

RULE 441. RESEARCH OPERATIONS

The provisions of Regulation IV except Rule 402 shall not apply to experimental research operations when the following requirements are met:

(a) The purpose of the operation is to permit investigation, experiment, or research to advance the state of knowledge or the state of the art; and

(b) The Air Pollution Control Officer has given written prior approval which shall include limitation of time.

The Air Pollution Control Officer shall not grant approval unless the operation is conducted in a manner to minimize emissions into the atmosphere to the maximum extent possible.

APPENDIX C

STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURE TM 9.1
GAS GENERATION TESTING
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. To evaluate the potential for gas generation at the WDI site, a laboratory anaerobic gas generation test will be conducted. The testing will be performed by incubating a soil sample under anaerobic conditions, to determine the volume of gas generated and the type of gas constituents generated.

2.0 TASK DESCRIPTION

1. As part of the TM-9 testing program, a laboratory evaluation of anaerobic gas generation will be performed on samples collected from various site locations and depths. As part of this evaluation of anaerobic gas generation, gas pressure measurements, gas analyses and microbial analysis will be conducted.

2. A sample of the soil will be analyzed initially to determine the relative moisture content nutrient concentration, hydrocarbon characteristics, volatile organic content and microbial populations and species.

3.0 REQUIRED MATERIALS

1. The following materials are required for this procedure:
   - Anaerobic test cell (see figure attached)
   - Incubator unit (light protected)
   - Pressure manometer
   - Inert air supply

4.0 TASK PERFORMANCE

4.1 ANAEROBIC GAS GENERATION PROCEDURE

1. Two kilograms of soil will be immediately placed in a closed vessel. The sample transfer will take place in an environmental chamber to avoid exposure to ambient air. The vessel will be purged for one hour with the chosen atmosphere and then closed airtight with a glass

stopper. The inert glass vessel has a volume of 3 liters, and has a sampling port with a PTFE septa as shown in Figure 1. A U-tube manometer using an inert silica oil will indicate up to 100 mL gas development.

2. The manometer will be also closed with a cap to allow no air to enter the vessel via diffusion. A calibrated capillary tube (cone-shaped manometer) will be used to produce accurate gas readings for small concentrations. The entire vessel will be placed into an incubator at a temperature of 30 degrees Centigrade (°C).

3. The gas level will be examined daily and gas withdrawn if necessary. Once a week measurements for preliminary analyses for hydrocarbons will be collected by GC/MS. The method used will be EPA TO-14, as well as methane and carbon dioxide. This will be done by MS only. If the gas development rate should be small only final methane and carbon dioxide determinations will being made after a one month period.

4. At the completion of the test, samples will be collected for formal analysis by the selected contract laboratory for the following constituents:
   - Methane (EPA Method 25.C)
   - TNMOC (EPA Method 25.C)
   - Vinyl Chloride (TO-14)
   - Benzene (TO-14)
   - Volatile Organics (TO-14)

4.2 SAMPLE IDENTIFICATION PROCEDURES

1. Each sample collected will be identified as having originated from the Site by prefacing each sample designation with WDI (Waste Disposal, Inc.), an alpha and numerical code, and will have an additional two-digit number as the last component of the sample identifier. The two digit number will correspond to the soil sampling round being performed. A sample identifier is illustrated below:
   - WDI-TS-01-03 Soil Sampling No. 01, third sampling round for this well.

4.3 ANALYTICAL PARAMETERS, METHODS AND SAMPLE PRESERVATION

1. Information on analytical parameters, sample containers, methods of preservation and holding times are provided and specified in the QAPP.

4.4 SAMPLE CONTAINER REQUIREMENTS

1. Each sample container will be labeled with the name of the person collecting the sample, date and time, identification code (as noted before), type of sample, preservation method, and analyses to be performed. The label will also indicate if the sample is to be held in an appropriate storage area by the laboratory, perform additional analysis based on the initial analytical results for representative samples.

4.5 BLANKS AND DUPLICATE SAMPLE PROCEDURES

1. Gas samples will be collected in duplicate where possible. In addition, an ambient air sample will also be collected for analysis.

4.6 SAMPLE PACKAGING AND TRANSPORTATION

1. Samples will be packaged in the following manner prior to shipment:
    - A custody seal will be placed on each sample container.
    - Each sample container will then be wrapped in bubble pack or other appropriate packaging material, placed in separate, sealable plastic bags, and then placed in an ice chest prechilled to 4° C with Blue Ice® packs and/or double-bagged ice packs.
    - The completed Chain-of-Custody record going to the laboratory will be placed in the cooler in a sealable plastic bag.
    - The cooler lid will then be secured with strapping/packaging tape. The cooler will then be purged with nitrogen to assure an anaerobic environment.
    - A custody seal will be signed and placed on the lid and front of the cooler for hinged coolers. Two custody seals will be attached to coolers with removable lids. One will be attached to the front and one to the back of the removable lid.
    - The coolers will be hand-delivered or shipped via overnight carrier to the laboratory at the end of each day's sampling. Samples will be shipped in a manner such that the laboratory will receive them within a 24 hour period, or less from the actual sampling time.

    Detailed transportation procedures are provided in SOP H in Appendix C of the RD Investigation Workplan (TRC, 1997).

4.7 PROCEDURES TO AVOID SAMPLE CONTAMINATION

1. Precautions will be taken to limit the contamination of samples from outside sources. Hands will be washed with distilled water, and rubber surgical gloves will be worn, especially if petroleum products are encountered.

2. Standard laboratory practices will be used to assure cross contamination is avoided during microbial testing.

4.8 SAMPLE DOCUMENTATION AND LABELING PROCEDURES

1. Sample documentation will be performed in accordance with the procedures in SOP J (TRC, 1997). In addition, monitoring and measurement data will be recorded in the Activity Report and/or an appropriate data monitoring sheet.

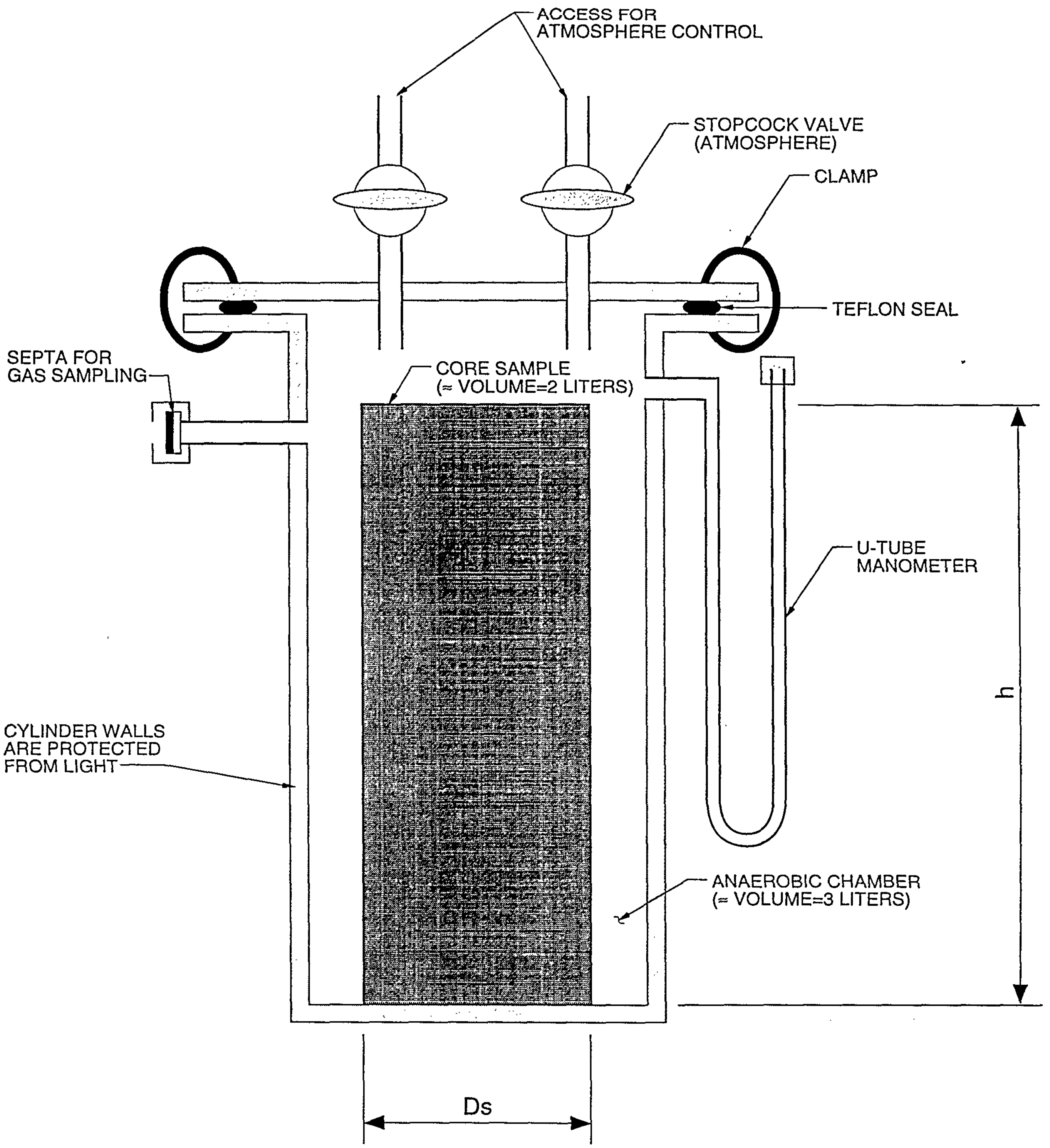
4.9 CHAIN-OF-CUSTODY PROCEDURES

1. Chain-of-Custodies will be used to maintain and document sample possessions. The Chain-of-Custody record will be initiated at the time of sampling and will contain the sample number, date and time, name and dated signature of the person taking the sample, as well as the methods by which each sample will be analyzed, and other pertinent information.

2. Sample transfers will be noted on the record sheet for each sample. Standardized Chain-of-Custody forms will be used for tracking samples from the point of origin (i.e., from the field) through laboratory processing and disposal.

3. More than one sample may appear on a Chain-of-Custody form. The form will accompany the sample(s), attached within the cooler. One copy of each form will be retained by field personnel prior to shipment of the sample(s) to the laboratory. An example Chain-of-Custody form is presented in Figure B.2 of the QAPP and Table 1 of SOP I (TRC, 1997). Copies of the Chain-of-Custody records completed by the laboratory will be returned with the results of laboratory analyses.

4. Chain-of-Custody procedures are discussed in detail in the QAPP and in SOP I (TRC, 1997).



SCHEMATIC OF LABORATORY TEST EQUIPMENT

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC	FIGURE 1

STANDARD OPERATING PROCEDURE TM 9.2
MICROBIAL ANALYSES
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. To evaluate the potential for gas generation at the WDI site, various microbial tests will be conducted. These tests include the following:
   - Aerobic bacterial counts
   - Anaerobic plate counts
   - Fluorescence microscopy/optical microscopy
   - Scanning electronic microscopy

2.0 TASK DESCRIPTION

1. As part of the TM-9 testing program, a laboratory evaluation of anaerobic gas generation will be performed on samples collected from various site locations and depths. As part of this evaluation of anaerobic gas generation, microbial analysis of the sump-like materials will be conducted initially and at the completion of the testing.

3.0 REQUIRED MATERIALS

1. The following materials and equipment are required to perform the necessary testing.
   - Aerobic plate counts:
     - Mineral medium agar 1.5 percent
     - 0.5 percent acetate-enriched brain-heart infusion
     - 50 mg/ml cyclohexamide (Sigma)
     - KH_2PO_4 buffer
     - Petri dishes
     - Supporting equipment: plate counter, autoclave and controlled atmosphere incubator
   - Anaerobic plate counts:
     - Similar materials for aerobic plate counts
     - Mineral medium agar with solid naphthalem as a carbon source
   - Fluorescence microscopy/optical microscopy:
     - Acridine orange solution
     - Optical microscope (≈ 1,000 magnification)

- Scanning electromicroscopy (SEM):
  - Glutaraldehyde fixative 2.5 percent
  - 0.1 M cacodylate buffer
  - 1 percent OsO4-cacodylate
  - Ethanol
  - PTFE membrane filters

4.0 PROCEDURES

4.1 MICROBIAL TESTING PROCEDURES

4.1.1 Aerobic Plate Counts

1. One gram of soil is mixed with 10 ml distilled autoclaved water. The sample is diluted four times, with three duplicate samples.

2. 0.1 ml of the dilution is added to each agar-containing petri dish. After the plates dried out they are spinned and a drop of hexane is added on filterpaper to the bottom of the petri dishes. The dishes are sealed and placed in an incubator at 25 degrees Celsius (° C). The incubator is then also set under a CO_2 atmosphere. The plates are counted after five, ten and fifteen days, if necessary.

3. Mineral medium agar is prepared as follows:
   - 1.5 percent noble agar with 1 liter mineral medium solution
   - Agar is heated to 80° C to melt the solid particle.
   - After the autoclaving, the agar is cooled to 60° to 80° C.
   - The agar solution is poured into the petri dish (the solidifying temperature is about 40° to 50° C).
   - The medium is prepared to count the total hydrocarbon bacteria using 0.5 percent (wt/vol.) acetate-enriched brain-heart infusion agar with 50 mg/ml cyclohexamide (Sigma).
   - The pH of the medium is adjusted to 7.0 by addition of phosphate buffer solution (3.0 ml of 0.74 ml KH_2PO_4 per liter and 7.0 ml of 0.57 M K_2HPO_4 per liter).
   - The buffers are prepared by adding 10 grams of either K_2HPO_4 or KH_2PO_4 per 100 ml distilled water (Walker and Colwell, 1973).
   - The medium for PAH degrading bacterium count is prepared agar plate made by spreading autoclaved minimal medium containing 1.5 percent noble agar.
   - The carbon source is supplied by vapor of solid naphthalene (Liu et al., 1995).

4.1.2 Anaerobic Plate Counts

1. One gram of soil is mixed with 10 ml distilled autoclaved water. The sample is diluted four times, with three duplicate samples.

2. 0.1 ml of the dilution is added to each agar-containing petri dish. After the plates dried out they are spinned and a drop of hexane is added on filterpaper to the bottom of the petri dishes. The dishes are sealed and placed in an incubator at 25 degrees Celsius (° C). Anaerobic plates are prepared under CO_2 atmosphere in a glovebox, but treated otherwise same. The incubator is then also set under a CO_2 atmosphere. The plates are counted after five, ten and fifteen, days if necessary.

3. Mineral medium agar is prepared as follows:
   - 1.5 percent noble agar with 1 liter mineral medium solution
   - Agar is heated to 80° C to melt the solid particle.
   - After the autoclaving, the agar is cooled to 60° to 80° C.
   - The agar solution is poured into the petri dish (the solidifying temperature is about 40° to 50° C).
   - The medium is prepared to count the total hydrocarbon bacteria using 0.5 percent (wt/vol.) acetate-enriched brain-heart infusion agar with 50 mg/ml cyclohexamide (Sigma).
   - The pH of the medium is adjusted to 7.0 by addition of phosphate buffer solution (3.0 ml of 0.74 ml KH_2PO_4 per liter and 7.0 ml of 0.57 M K_2HPO_4 per liter).
   - The buffers are prepared by adding 10 grams of either K_2HPO_4 or KH_2PO_4 per 100 ml distilled water (Walker and Colwell, 1973).
   - The medium for PAH degrading bacterium count is prepared agar plate made by spreading autoclaved minimal medium containing 1.5 percent noble agar.
   - The carbon source is supplied by vapor of solid naphthalene (Liu et al., 1995).

4.1.3 Fluorescence Microscopy/Optical Microscopy

1. Two methods will be applied: direct count of cells on the surface of the soil particles, and count in a hemocytometer (cells/mass soil).

2. The soil is placed directly on a slide and a 0.1 acridine orange solution will be added. After 10 minutes the slide will be observed under the microscope in the fluorescence mode. Microorganisms (orange) of different shapes will be counted in a grid of the microscope (566 um^2 per grid at 40x magnification). Twenty grids in three different slides will be counted and the cell count averaged. The averaging method will be altered if large differences in the cell numbers exist.

3. One gram of soil is mixed with 9.7 ml distilled autoclaved water and mixed for three minutes and sonicated for additional two minutes. Five dilutions (8 ml distilled H_2O + 1 ml Acridine Orange (AO) solution + 1 ml test mixture) will be made. The AO concentration will be chosen for the test tube to have a final concentration of 1/10, 1/100 1 g A_2O_2/10,100 ml water. This AO concentration has shown the best results in previous testing. The solutions will be counted in the hemocytometer under optical as well as fluorescent light. Twenty cells will be counted per slide and averaged.

4.1.4 Scanning Electromicroscopy

1. The soil sample is placed on a PTFE membrane (0.45μm filter). The membrane is placed in a vacuum manifold.

2. The following solutions are applied on the membrane and are afterwards removed by turning on the vacuum (less than 1 psi pressure drop applied):
   - Fixation:
     - 2.5 percent Glutaraldehyde fixative for 30 minutes
     - 0.1M cacodylate buffer, three washes for five minutes
     - One percent OsO4 cacodylate at pH 7.4 for 30 minutes
     - 0.1M cacodylate buffer, three washes for five minutes
   - Dehydration:
     - 35 percent EtOH for 10 minutes
     - 50 percent EtOH for 10 minutes
     - 70 percent EtOH for 10 minutes
     - 95 percent EtOH for 10 minutes
     - 100 percent EtOH for 10 minutes
     - 100 percent EtOH for 20 minutes
     - 100 percent EtOH for 30 minutes
   - Post Fixation:
     - One percent osmium tetroxide, 0.1M cacodylate buffered to pH 7.4, followed by 2.5mM CaCL2 with 230 mOsM until sample is dried out
     - Same step but with 0.2M cacodylate buffer, until sample is dried out

3. Membrane pieces with dried soil are cut out, fixed with graphite glue on a stub and sputtered for one minute with gold. The stub is analyzed in the SEM.

4.2 SAMPLE IDENTIFICATION PROCEDURES

1. Each sample collected will be identified as having originated from the site by prefacing each sample designation with "WDI" (for Waste Disposal, Inc.), an alpha and numerical code, and will have an additional two-digit number as the last component of the sample identifier. The two-digit number will correspond to the ground water sampling round being performed. The sample identifier is illustrated below:
   - WDI-TS-01-03 Soil Sampling No. 01, third sampling round for this well.

4.3 ANALYTICAL PARAMETERS, METHODS AND SAMPLE PRESERVATION

1. Information on analytical parameters, sample containers, methods of preservation, and holding times are specified in the QAPP. (Appendix B of the RD Investigation Activities Workplan [TRC, 1997]).

4.4 SAMPLE CONTAINER REQUIREMENTS

1. Each sample container will be labeled with the name of the person collecting the sample, date and time, identification code, type, preservation method, and analyses to be performed. The label will also indicate if the sample is to be held in appropriate storage by the laboratory until the geologist/engineer determines if analyses are to be performed based on initial analytical results for representative samples.

4.5 BLANKS AND DUPLICATE SAMPLE PROCEDURES

1. Samples will be prepared for triplicate microbiological counts. Duplicate samples will be prepared for SEM for fluorescence/optical microscopy.

4.6 SAMPLE PACKAGING AND TRANSPORTATION

1. Samples will be packaged in the following manner for shipment:
   - A custody seal will be placed on each sample container.

- Each sample container will then be wrapped in bubble pack or other packaging material, placed in separate, sealable plastic bags, and then placed in an ice chest prechilled to 4° C with Blue Ice® packages or double-bagged ice packets.
- The completed Chain-of-Custody record going to the laboratory will be placed in the cooler in a sealable plastic bag.
- The cooler lid will then be secured with strapping/packaging tape. The cooler will be purged with nitrogen to assure an anaerobic environment.
- A custody seal will be secured, signed and attached to the lid and the front of the cooler for hinged coolers. Two custody seals will be attached to coolers with removable lids. One will be attached to the front and one to the back of these coolers.
- The coolers will be hand-delivered or shipped via overnight carrier to the laboratory at the end of each day's sampling. Samples will be shipped in a manner such that the laboratory will receive them within a 24 hour period, or less from the actual sampling times.

Detailed transportation procedures are provided in SOP H (TRC, 1997).

4.7 PROCEDURES TO AVOID SAMPLE CONTAMINATION

1. Precautions will be taken to limit the contamination of samples from outside sources. Hands will be washed with distilled water, and rubber surgical gloves will be worn, especially if petroleum products are encountered.

2. Standard laboratory practices will be used to assure cross contamination is avoided during microbial testing.

4.8 SAMPLE DOCUMENTATION AND LABELING PROCEDURES

1. Perform sample documentation in accordance with the procedures in SOP J (TRC, 1997). In addition, monitoring and measurement data will be recorded immediately in the Activity Report and/or an appropriate data monitoring sheet.

4.9 CHAIN-OF-CUSTODY PROCEDURES

1. Chain-of-Custody forms will be used to maintain and document sample possessions. The Chain-of-Custody record will be initiated at the time of sampling and will contain the sample number, date and time, name and dated signature of the person taking the sample, as well as the methods by which each sample will be analyzed, and other pertinent information.

2. Sample transfers will be noted on the record sheet for each sample. Standardized Chain-of-Custody forms will be used for tracking samples from the point of origin (i.e., in the field) through laboratory processing and disposal.

3. More than one sample may appear on a Chain-of-Custody form. The form will accompany the samples, attached within the ice chest. One copy of each form will be retained by field personnel prior to shipment of the sample(s) to the laboratory. An example Chain-of-Custody form is presented in Figure B.2 of the QAPP and Table 1 of SOP I (TRC, 1997). Copies of the Chain-of-Custody records completed by the laboratory will be returned with the results of laboratory analyses.

4. Chain-of-Custody procedures which are discussed in detail in the QAPP and in SOP I (TRC, 1997).

5.0 REFERENCES

Strugger, S. *Fluorescence Microscope Examination of Bacteria in Soil*, Canad. J. Res. 26:188-193.

STANDARD OPERATING PROCEDURE TM 9.3
FLUX BOX TESTING
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. To evaluate the potential for surface emissions of methane and volatile organics, flux chamber measurements are performed. The flux measurements process uses an enclosure device, referred to as an emission isoloation flux chamber, to sample emissions from a defined surface area. To measure the flux, a carrier gas is added at a controlled rate to the chamber and the effluent is monitored and/or sampled.

2.0 TASK DESCRIPTION

1. As part of the TM-9 testing program, an evaluation of the surface flux will be conducted, at each of the SVE/In-situ testing locations. The surface flux will be monitored in the field using field instrumentation for methane and volatile organic compounds. Samples of the flux chamber effluent gas will also be sampled for laboratory analysis for methane, benzene, vinyl chloride and Volatile Organic Compounds (VOCs).

2. The flux box is shaped like a hemisphere to facilitate mixing of the constituents throughout the carrier gas before they exit the box. The flow rate of carrier gas will be kept as low as possible to produce a maximum concentration of the constituent in the exiting carrier gas.

3. The flux box will constructed according to the design developed by Radian Corporation under contract to EPA, as shown in Figure 1.

4. The results of the flux measurement will be used to help evaluate the effectiveness of SVE and the In-situ gas generation test.

3.0 REQUIRED MATERIALS

1. The following materials are required for this procedure:
    - Flux Chamber (see Figure 1)
    - Field monitoring equipment
    - Ultra pure carrier gas (nitrogen)
    - Flow monitoring/regulator
    - Temperature monitoring device (thermocouple)

4.0 TASK PERFORMANCE

4.1 FLUX TESTING PROCEDURES

1. The selected area for flux testing will be cleared of debris and surface vegetation. The flux box will be embedded about 1 inch into the soil, using pressure on the chamber edges. A layer of soil will then be applied around of the chamber to reduce any potential air leaks.

2. A flux measurement will consist of blowing air through a small teflon tube through the flux box. Air will be blown into the inlet fitting at a known flow rate. The flow rate will be measured on the inlet port along with the temperature. Measurement of temperature allows calculation of the flow rate at standard or reference conditions of temperature and pressure. Barometric pressure will also be recorded during the testing.

3. The concentration of each constituent of interest will be measured using field instruments at the outlet every 30 minutes during the test. A sample of the effluent gas will be collected using a Summa canister every two hours for laboratory analysis. Each flux test will be operated for approximately four to six hours. The samples will be analyzed for formal analysis by the selected contract laboratory for the following constitution:
   - Methane (EPA Method 25.C)
   - TNMOC (EPA Method 25.C)
   - Vinyl Chloride (TO-14)
   - Benzene (TO-14)
   - VOCs (TO-14)

4. Knowing the concentration of combustible gas representative of surface emissions, the emission rate can be determined by the following expression:
   - $E = {}^{CQ}/A$ where:
     - E = Combustible Gas Emission Rate ($ft^3/min - ft^2$)
     - C = Concentration of Combustible Gas Due to Surface Emissions C_2-C_1, percent by volume
     - C_2 = Concentration of Combustible Gas Exiting the Flux Box, percent by volume
     - C_1 = Concentration of Combustible Gas Entering the Flux Box, percent by volume
     - Q = Flow Rate of Air Entering the Box, ft^3/min
     - A = Surface Area Enclosed by the Box, ft^2

Surface emissions stated in standard cubic feet per minute (SCFM) will be determined from the above data which will be corrected for temperature of the gas at the flow meters.

6. The air in the flux box will be purged between test locations by venting the box to the atmosphere during transit to the next location.

7. It may be necessary at the beginning of the test to vary the inlet gas flow rate in order to raise or lower the concentration of the constituents of concern to within the measurement range of the field monitoring equipment. If condensation forms on the inside of the flux box, it will be noted in the field log (see Table 1). Condensation could reduce exit gas concentrations of water soluble compounds, although this should be significant for the expected constituents of concern.

4.2 SAMPLE IDENTIFICATION PROCEDURES

1. Each sample collected will be identified as having originated from the site by prefacing each sample designation with "WDI" (for Waste Disposal, Inc.), an alpha and numerical code, and will have an additional two-digit number as the last component of the sample identifier. The two-digit number will correspond to the flux chamber sampling round being performed. The sample identifier is illustrated below:
   - WDI-FC-01-03 Flux Chamber No. 01, third sampling round for this well test.

4.3 ANALYTICAL PARAMETERS, METHODS AND SAMPLE PRESERVATION

1. Information on analytical parameters, sample containers, methods of preservation, and holding times are specified in the QAPP.

4.4 SAMPLE CONTAINER REQUIREMENTS

1. Each sample container will be labeled with the name of the person collecting the sample, date and time, identification code, type, preservation method, and analyses to be performed. The label will also indicate if the sample is to be held in appropriate storage by the laboratory until the geologist/engineer determines if analyses are to be performed based on initial analytical results for representative samples.

4.5 BLANKS AND DUPLICATE SAMPLE PROCEDURES

1. One duplicate sample will be collected daily. In addition, one field blank will also be collected daily.

4.6 SAMPLE PACKAGING AND TRANSPORTATION

1. Samples will be packaged in the following manner for shipment.
   - A custody seal will be placed on each sample container.
   - Each sample container will then be wrapped in bubble pack or other packaging material, placed in separate, sealable plastic bags, and then placed in an ice chest prechilled to 4° C with Blue Ice® packages and/or double-bagged ice packets.
   - The completed Chain-of-Custody record going to the laboratory will be placed in the cooler in a sealable plastic bag.
   - The cooler lid will then be supported with strapping/packaging tape. The cooler will be purged with nitrogen to assure an anaerobic environment.
   - A custody seal will be signed and attached to the lid and the front of the cooler for hinged coolers. Two custody seals will be attached to coolers with removable lids. One will be attached to the front and one to the back of these coolers.
   - The coolers will be hand-delivered or shipped via overnight carrier to the laboratory at the end of each day's sampling. Samples will be shipped in a manner such that the laboratory will receive them within a 24 hour period or less, from the actual sampling times.

   Detailed transportation procedures are provided in SOP H.

4.7 PROCEDURES TO AVOID SAMPLE CONTAMINATION

1. Precautions will be taken to limit the contamination of samples from outside sources. Hands will be washed with distilled water, and rubber surgical gloves will be worn, especially if petroleum products are encountered.

4.8 SAMPLE DOCUMENTATION AND LABELING PROCEDURES

1. Sample documentation will be performed in accordance with the procedures in SOP J. In addition, monitoring and measurement data will be immediately recorded in the Activity Report and/or an appropriate data monitoring sheet.

4.9 CHAIN-OF-CUSTODY PROCEDURES

1. Chain-of-Custody procedures which are discussed in the QAPP and in SOP I will be used to maintain and document sample possessions. The Chain-of-Custody record will be initiated at the time of sampling and will contain the sample number, date and time, name and dated signature of the person taking the sample, as well as the methods by which each sample will be analyzed, and other pertinent information.

2. Sample transfers will be noted on the record sheet for each sample. Standardized Chain-of-Custody forms will be used for tracking samples from the point of origin (i.e., in the field) through laboratory processing and disposal.

3. More than one sample may appear on a Chain-of-Custody form. The form will accompany the sample(s), attached within the ice chest. One copy of each form will be retained by field personnel prior to shipment of the sample(s) to the laboratory. An example Chain-of-Custody form is presented in Figure B.2 of the QAPP and Table 1 of SOP I. Copies of the Chain-of-Custody records completed by the laboratory will be returned with the results of laboratory analyses.

4. For specific Chain-of-Custody procedures, refer to SOP I.

5.0 REFERENCES

1. Practical Guidance for Flux Chamber Measurements of Fugitive Volatile Organic Emission Rates. Bart Eklund, Journal Air Waste Management Association 42:1583-1591. December 1992.

TABLE 1

FIELD DATA SHEET
FLUX BOX GAS EMISSIONS MEASUREMENTS

Date ____________________ Sampler(s) ____________________

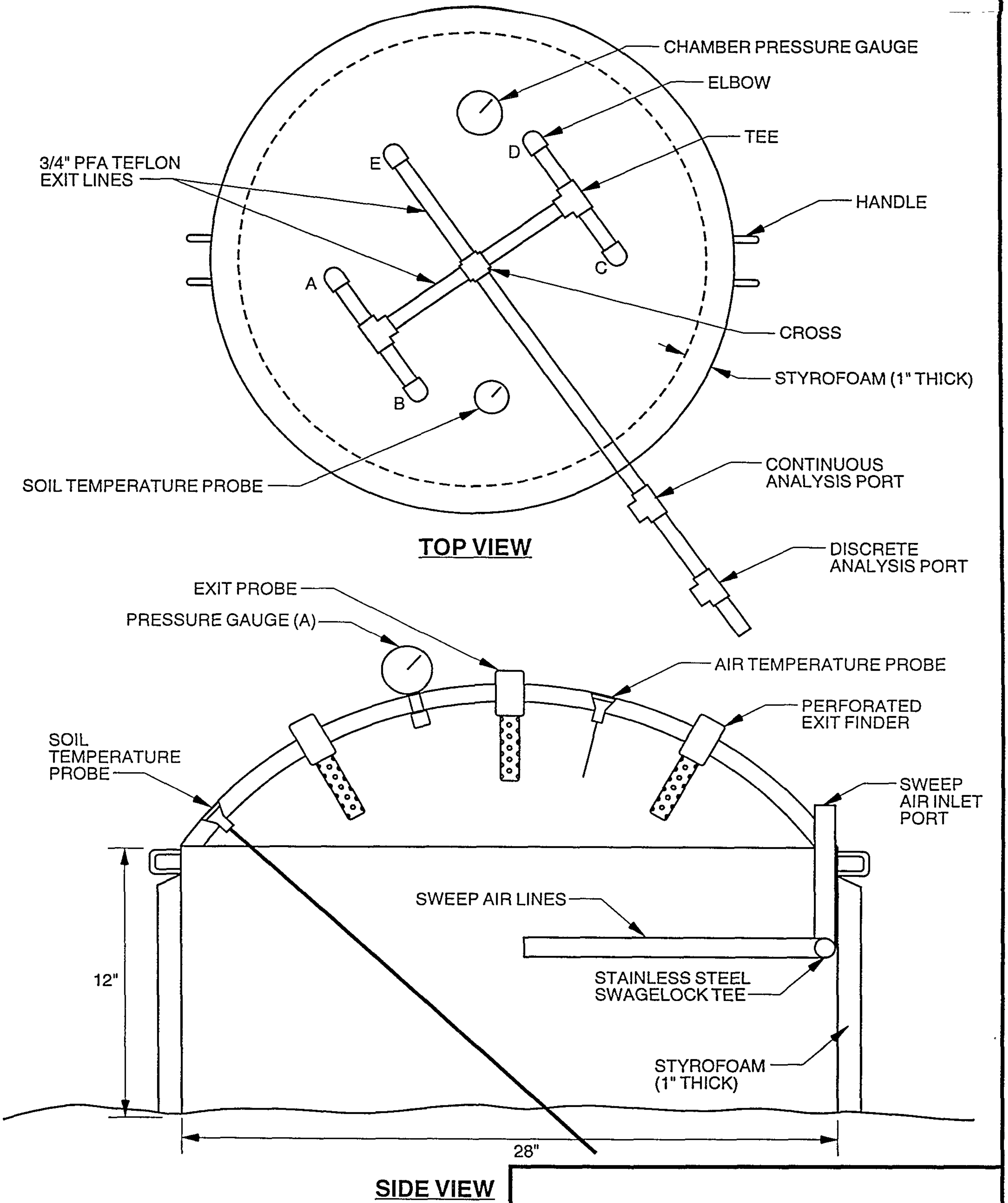
Location ____________________ Coordinates X: __________ Y: __________

Surface Description ____

Concurrent Activity ____

TIME	AIR FLOW RATE, Q(ft^3/min)	COMBUSTIBLE GAS CONCENTRATION (% LEL)		ATM. PRESSURE	TEMP. (°F)		SAMPLE TYPE NUMBER/ LOCATION	COMMENTS
		AIR INFLOW LINE	AIR OUTFLOW LINE	(mm, Hg)	ATM.	INFLOW AIR STREAM		

General Comments: ____



DRAFT

FLUX CHAMBER WASTE DISPOSAL, INC. SANTA FE SPRINGS, CALIFORNIA	
TRC	**FIGURE 1**

5.0

TECHNICAL MEMORANDUM NO. 9A
WASTE DISPOSAL, INC. SUPERFUND SITE

SUBJECT: Soil Vapor Extraction Testing

DATE: May 28, 1998

SUBMITTED TO: Cynthia Wetmore, U.S. EPA

PROJECT NO.: 94-256

SUBMITTED BY: Ian Webster, WDIG Project Coordinator

CC: John Wondolleck, CDM
Tim Crist, CIWMB
Roberto Puga, TRC
Dave Becker, U.S. Army
Theodore Tsotsis, USC
Bill Stephanatos, Weston

1.0 DESCRIPTION OF DESIGN MODIFICATIONS:

1. This technical memorandum (TM) No. 9A describes field and analytical procedures proposed to evaluate soil vapor extraction (SVE) technology. The purpose of this test is to investigate gas generation rates and onsite vapor well/probe data, which has indicated potentially high methane concentrations in various onsite locations.

2. The fundamental parameters of gas generation, conductivity, advection and diffusion have been calculated for the specific conditions in the fill and sump-like material layers at the Waste Disposal, Inc. (WDI) Superfund site. These calculations were transmitted to the U.S. Environmental Protection Agency (EPA) in the February 13, 1998 transmittal to Cynthia Wetmore titled "Calculations of Air Conductivity, Methane Generation and Advection" and the March 30, 1998 submission to Andria Benner titled "Preliminary Supplemental Site Characterization Report." The purpose of this TM is to describe SVE testing that will be used to develop additional field data on various gas parameters, including gas generation rates and gas conductivity.

3. Separate SVE tests will be conducted in the two layers adjacent to the sump-like material layer (i.e., either the fill layer above the sump-like material layer or the native soil layer beneath).

4. This TM is arranged to first discuss the rationale for the SVE test, followed by a description of proposed specific field procedures and calculations. This revision contains more detailed rationale and descriptions of field procedures and analysis of results. Field activities are expected to proceed with a design/build structure in which changes will be made real-time in experimental parameters as new information is obtained in the field, with EPA's representatives' concurrence. Each change in design or procedures made in the field will be documented and will include a description of the change and the rationale for the change.

2.0 RATIONALE FOR SVE TESTING:

1. SVE testing is intended to provide information on the rate of generation of various gas constituents and the total gas as well as the ability of these gases to migrate within and/or to be removed from either the fill layer overlying, or the native soil beneath, the sump-like material.

2. Table 1 provides a summary of the relevant Constituents of Concern (COCs) for SVE testing and the respective methods to be used for field monitoring and laboratory analyses. The table also gives the rationale for making specific measurements.

3. The objective of SVE testing is to determine the following site-specific parameters for each of the five locations:
   - Air conductivity in each layer adjacent to the gas-producing sump-like material layer
   - SVE radius of influence
   - Flow rate versus vacuum
   - Long-term soil gas concentration trends, including rebound
   - Condensate production
   - Air handling and treatment effectiveness

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4. SVE testing will determine the ability of an induced vacuum to withdraw soil gas from five locations (see Figure 1) selected to represent the different combinations of proximity between sump-like material and onsite buildings. This ability or inability to withdraw soil gas will be critical to future consideration of SVE as a potentially viable remedial option to control the potential pathways for gas, generated in the sump-like material, to migrate toward buildings and the ground surface. The potential for soil gas migration control by SVE will be evaluated as part of this TM.

5. More specifically, gas emitted from the top of the sump-like material would be expected to migrate upwards towards the ground surface and potentially to the bottom of slabs beneath commercial/industrial buildings. In contrast, gas emitted from the bottom surface of the sump-like material would be expected to migrate laterally until it reaches the edge of the confining area. At that point, migration could proceed both laterally outwards and vertically upwards towards the surface.

6. The five locations for these tests are based on the presence of sump-like material near potential surface receptors such as on-site commercial/industrial buildings. The volume flow rates achieved in the extraction well from specified vacuum levels applied by the blower will provide an indication of the air conductivity of each of these two layers at each of the five test locations. The product of the constituent concentrations and volume flow rates will provide the constituent generation rate from the sump-like material into the collection layer for the area of influence as indicated by the responses at the surrounding monitoring wells.

3.0 DESCRIPTION AND PROCEDURES FOR SVE TESTING

1. The procedure and conditions for SVE testing is described in the following section. Enough detail is provided to describe the scale and sequence of activities. Some test conditions will be adjusted in the field on a design/build basis, using early results.

2. The results of SVE testing will be used to calculate the following gas parameters:
   - Air conductivity in the tested layer (e.g., fill material)
   - Methane (CH_4) and total nonmethane organic compound (TNMOC) generation rate
   - Benzene (BZ), vinyl chloride (VC), trichloroethene (TCE), tetrachloroethene (PCE), and other volatile organic compound (VOC) emission rates

3. The approximate location for each of the five SVE tests are shown in Figure 1. These locations were selected in joint meetings of the EPA team and the WDIG based on the vapor well data and the location of sump-like materials. A summary of the locations, proposed test sequence and associated well information is provided in Table 2. Appendix A provides a list of existing vapor wells, construction data, and latest constituent concentrations measured. These concentrations indicate the relative amount of subsurface contaminants, both at locations chosen and not chosen for SVE.

4. At each of the five test locations, an existing vapor well will be used as a monitoring well, or if the vapor well is located in the proper area, it may be used as an extraction well. In either case, the extraction well will be surrounded with a specific geometric pattern of zone of influence monitoring wells. In the native soil, beneath the sump-like material layer, air injection wells will also be installed. The depth of the perforations in the air injection and influence monitoring wells will be similar to those in the extraction wells (see Figures 2 and 3). These figures represent the situation where the vapor monitoring well is not suitable to be used as the extraction well. In this situation, the vapor monitoring well is used as the source of gas samples to be analyzed for composition as listed in the zone of influence monitoring wells.

5. Example configurations of the extraction, injection and influence-monitoring wells for SVE in the fill and native soil layers are shown in Figures 2 and 3, respectively. The dimensions shown in each of these figures are estimated separately for the different depths of these two SVE test layers. In the native soil, four injection wells are arranged in a square geometry to determine the area potentially swept by SVE. This area, multiplied by the length of slotted interval of the extraction well, determines the subsurface volume subjected to extraction.

6. The zone of influence monitoring wells are placed at increasing distances in different directions (see Figures 2 and 3) to determine the maximum distance at which the extraction vacuum can be detected. In general, zone of influence calculations indicate that the appropriate separation distances between injection and monitoring wells are longer in the more permeable layers and shorter in less permeable layers. Based on the results of the first SVE test, the distance of the influence monitoring wells may need to be adjusted.

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7. At the beginning of each test, barometric pressure and the concentrations of the following constituents will be measured in the extraction flow:

   - CH_4
   - TNMOCs
   - BZ
   - VC
   - Other VOCs
   - Oxygen (O_2)
   - Carbon Dioxide (CO_2)

   These concentrations will be measured initially and at various intervals, as shown in Table 3. The instruments or laboratory methods that will be used to measure these constituents are listed in Table 3. These measurements and the characterization of gas that follows will be completed for the native soil layer before making the final decision on conducting a SVE test in that layer.

8. The SVE test will be started with a low vacuum (approximately 10 to 20 inches of water column [wc]). The vacuum will then be increased in steps of approximately 10 to 20 inches wc, between which the vacuum in each of the zone of influence monitoring wells will be measured. Each vacuum step will be maintained long enough to obtain a stable vacuum in monitoring wells that are influenced, or at least two hours, whichever is less. The goal is to obtain a mild vacuum (e.g., 0.1-inch wc) in the most distant well at an extraction well vacuum and flow rate that can be sustained by the blower. The blower will have a maximum suction capability of approximately 160 inches wc. The flow rate from the extraction well will be measured after it has stabilized.

9. The time will be measured between the imposition of the next higher vacuum step and the stabilized vacuum levels, if any are measured in the zone of influence monitoring wells.

10. The SVE test in the fill material layer has an extraction well but no air injection wells because air will enter the top of the fill zone over the entire surface area. The SVE test in the native soil layer is deep enough to require air injection wells at the lateral boundary of the zone of influence through which air will be allowed to enter. When a vacuum is first detected in the zone of influence wells in the native soil layer, pressure will be allowed to equilibrate prior to opening the air injection wells. The air injection wells will be opened in a stepwise manner. These wells will allow ambient air to enter the native soil layer, but will not be put under pressure. Putting such wells under pressure could push contaminant vapor out from under sump-like material toward buildings on the property line. This procedure will preserve the approximately square geometry of the zone of influence shown in Figure 3. These wells will be opened stepwise to further allow measurement of the time it takes for the layer to reach pressure equilibrium.

11. After pressure equilibrium is achieved at the maximum vacuum and flow fields, the SVE test will be run under constant conditions for up to one week. The rate at which each constituent is removed will be calculated in terms of mass per unit time (e.g., pounds per day) after each interval when concentrations and extraction flow rates are measured. The mass removal rates will be used to help determine when the test will be ended. Each test will be terminated at the end of one week if each of the mass removal rates for TNMOCs and methane is less than 0.1 pound per day. This rate is judged to be the threshold below which no significant benefit would be derived from extending the test. At the end of this period, the system will be sampled, and then shut off to allow measurement of the rate of recovery of the system, as shown in Table 3.

12. After completion of SVE testing, the vapor extraction well (or monitoring well) will be isolated and its constituent concentration measured at various intervals, as indicated in Table 3. Long-term effectiveness can be evaluated by monitoring the vapor well's recovery period.

13. Schematics of the construction of typical SVE test wells in the fill material and native soil layers are shown in Figures 4 and 5, respectively. The continuously slotted interval will be adjusted to fit in the fill layer or the native soil layer. As indicated above, where possible, existing vapor monitoring wells will be used.

14. A schematic of typical SVE test equipment that is expected to be used is shown in Figure 6. The water knockout (also called a V/L Separator) is placed before the blower to prevent damage to its impeller blades. A high efficiency demister in the water knockout acts also as a particulate filter. General specifications for the SVE test equipment are provided in Table 4. Figure 7 provides a P&ID for the proposed SVE unit. Hundreds of these units have been manufactured and sold, including some for EPA Superfund sites. Table 5 gives an example of the SVE start-up procedure.

15. The water knockout will be checked frequently during the beginning of each SVE test to assure that water does not accumulate such that it is carried over into the blower. If necessary, a level control and pump will be set up in the water knockout to automate water removal. If water is extracted at such a high rate as to make gas extraction insignificant or erratic, the SVE test in that location and layer will be cancelled or at least postponed. No replication of SVE tests is planned at this time. Test results will be used to determine if an additional SVE trial would be needed.

16. For purposes of this testing, a South Coast Air Quality Management District (SCAQMD) permitted skid-mounted treatment unit will be used. Additionally, an SCAQMD permit to construct and operate under Rule 441 for research operations will be obtained. A copy of this rule is included in Appendix B.

4.0 EVALUATION/ANALYSIS OF SVE TEST DATA

1. During SVE testing the following data will be recorded:
   - Blower vacuum
   - Blower flow rate
   - Concentrations of:
     - CH_4
     - TNMOC
     - O_2
     - CO_2
     - BZ
     - Vinyl chloride
     - VOCs
   - Vacuum in each zone of influence monitoring well

2. These recorded data will be used to calculate the following gas parameters:
   - Extraction rate (mass per unit time) of each gas constituent
   - Extraction (influenced) volume of soil

3. Vacuum measured in the zone of influence monitoring wells will be used to calculate the area of influence. Volume of influence equals the area of influence in each layer multiplied by the length of the slotted interval of the extraction well in the fill or in the native soil. The extraction flow rate achieves at each vacuum in the step test will be plotted against each other as shown in Figure 8. The vacuum at each zone of influence monitoring well will be plotted in a distance-drawdown graph as shown in Figure 9. This figure provides a graphical method to estimate radius of influence (r_e). After the last vacuum step is applied to produce the maximum vacuum used in the test, the vacuum at the extraction well and at selected zone of influence monitoring wells will be plotted against time to show the approach to long-term equilibrium. The combination of extraction flow rate and constituent concentration will be used to create plots of cumulative constituent mass removed versus time as shown in Figure 10.

4. After the SVE system is turned off, the rate of increase of constituent concentrations will provide a measure of system "rebound" or recovery rate. During this "rebound" phase the following data will be recorded:
   - Concentration of:
     - CH_4
     - TNMOC
     - Benzene
     - Vinyl chloride
     - VOCs
     - O_2 (as a measure of biological activity)
     - CO_2 (as a measure of biological activity)
   - Vacuum in each zone of influence monitoring well

   These parameters will be measured daily for the first three days after shutdown, as shown in Table 3. After the first three days, these parameters will be measured every three days for up to 14 days.

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5.0 SCHEDULE OF TESTS

1. Figure 11 provides a schedule of activities. As indicated, approximately 15 weeks will be required to complete the field activities and reporting requirements after approval of the TM and supporting documents.

6.0 AMENDMENTS TO QAPP AND FSAP TO REFLECT MODIFICATIONS

1. No QAPP or FSAP modifications are required to complete the SVE technology evaluation. Table 6 provides a list of the various activities and the relevant QAPP/SAP sections.

RPM APPROVAL STATUS:

BY: ______________________ **DATE:** ______________

_____ **Approved** _____ **Disapproved** _____ **Additional Information Required**

TABLE 1
SUMMARY OF SAMPLING AND ANALYSIS METHODS

CONSTITUENT OF CONCERN	RATIONALE FOR MONITORING	FIELD MONITORING METHOD	LABORATORY METHOD OF ANALYSIS	COMMENT
Chemical Parameters				
Methane (CH_4)	• Known Site Constituent	• Flame Ionization Detector (FID) • GEM 500 Landfill Gas Detector using Nondispersive Infrared (NDIR)	• EPA 25.C	• FID detects total organic compounds (TOC) expressed as methane. TNMOC can be removed with charcoal leaving CH_4. GEM-500 uses NDIR to measure CH_4 alone.
Total Non-Methane Organic Compounds (TNMOC)	• Includes a Large Number of Known Site Constituents	• FID • Photo Ionization Detector (PID)	• EPA 25.C	• FID used with and without charcoal, measures TOC, CH_4 and NMOC by difference. PID measures only NMOC.
Volatile Organic Compounds (VOCs)	• Known Site Constituents	• FID • PID	• TO-14	• Laboratory analysis of TNMOC.
Benzene (Bz)	• Known Site Constituent	• GC/FID	• TO-14	
Vinyl Chloride (VC)	• Known Site Constituent	• No Accurate Field Method Available	• TO-14	
Oxygen (O_2)	• Used to Evaluate Soil Gas Conditions and Biological Degradation Conditions (including degree of anaerobic or aerobic conditions)	• GEM-500 Landfill Gas Detector using Electrochemical Cell	• Electrochemical Detector	
Carbon Dioxide (CO_2)	• Used to Evaluate Soil Gas Conditions and Biological Degradation Conditions	• GEM-500 Landfill Gas Detector using NDIR	• NDIR	
Hydrogen Sulfide (H_2S)	• Potential Anaerobic Sulfur Decomposition Product • Potential Health Concern	• Gold Film	• Electrolytic Conductivity Detector	• Not considered relevant, since has not been identified in non-vapor well sampling.

TABLE 1
SUMMARY OF SAMPLING AND ANALYSIS
(Continued)

CONSTITUENT OF CONCERN	RATIONALE FOR MONITORING	FIELD MONITORING METHOD	LABORATORY METHOD OF ANALYSIS	COMMENT
Chemical Parameters (Continued)				
Carbon Monoxide	• Potential Indicator of Subsurface Incomplete Combustion	• NDIR	• NDIR	• Not considered relevant, because not identified in routine vapor well sampling. • No source of incomplete combustion.
Physical Parameters				
Pressure	• Key Indicator of Gas Condition Including: - SVE Indicator of Zone of Influence	• Pressure Gauge (e.g., Magnahelic) • Pitot Tube (differential pressure)	• None	
Flow Rate	• Needed Along with Concentration to Calculate Mass Removal Rate	• Pitot Tube Flow Meter	• None	

TABLE 2

PROPOSED SVE TESTING LOCATIONS

AREA	EXISTING VAPOR WELL NO.(1)	MONITORING INTERVAL (ft. bgs)	PROPOSED SVE TEST INTERVAL	COMMENTS	PROPOSED TEST SEQUENCE
8	VW-49	5-10 15-18 25-30	√ √ √	Well outside of impacted area on edge of waste material. SVE trial of three zones.	1
5	VW-51	5-8 13-18 23-30	√ (2) √	Well placed through impacted material at Brothers "considered high profile zone by EPA."	2
7	VW-25	(3) (3) (3)	√ √ √	Currently screened through all zones (5' - 35'). Planned to be supplemented with a triple-completion vapor monitoring well.	3
2	VW-48	5-8 12-17 30-35	√ (4) √	Liquid present in well may be problematic. Area considered high profile by EPA because of liquids concerns. Activities may be implemented later in program, as additional field data is collected.(5)	4
2	VW-45	7.5-12.5 18.5-21.5 27-30	√ (2) √	Liquid present in well may be problematic. Area considered high profile by EPA because of liquids concerns. Activities may be implemented later in program, as additional field data is collected.	5

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(1) See Figure 1 for locations.
(2) This interval is excluded because its native air conductivity = 2E-10 cm/sec, which is too low to support SVE. Data is provided in Attachment A.
(3) These monitoring intervals will be determined at the time of installation of this triple-completion well.
(4) This probe depth was excluded because it is completed in the waste zone.
(5) This area is considered analogous to PB/PW-2.

TABLE 3

SAMPLING AND ANALYSIS SCHEDULE
SVE TESTING

TEST	FIELD PARAMETERS			LABORATORY SAMPLING	
	Parameter	Method	Frequency	Method	Frequency
Startup and Step Testing (0-8 hours)	• CH_4 • TNMOC • O_2 • CO_2 • Vacuum Flow • Benzene • Vinyl Chloride • Volatile Organics	• FID/PID • FID/PID • GEM 500 • GEM 500 • Magnahelic/Pitot tube • GC/FID • GC/FID • GC/FID	Initially, then hourly for the first 8 hours (i.e., at the start, midpoint and end of each 2-hour step test)	• EPA 25.C • EPA 25.C, TO-14 • Electrochemical Cell • NDIR • Field Only • TO-14 • TO-14 • TO-14	Every 2 Hours
Initial Operations (8-48 hours)	• CH_4 • TNMOC • O_2 • CO_2 • Vacuum Flow • Benzene • Vinyl Chloride • Volatile Organics	• FID/PID • FID/PID • GEM 500 • GEM 500 • Magnahelic/Pitot tube • GC/FID • GC/FID • GC/FID	Every 4-6 Hours	• EPA 25.C • EPA 25.C, TO-14 • Electrochemical Cell • NDIR • Field Only • TO-14 • TO-14	Every 12 Hours
Continued Operations (48 hours to Shutdown)	• CH_4 • TNMOC • O_2 • CO_2 • Vacuum Flow • Benzene • Vinyl Chloride • Volatile Organics	• FID/PID • FID/PID • GEM 500 • GEM 500 • Magnahelic/Pitot tube • GC/FID • GC/FID • GC/FID	Monitor Daily	• EPA 25.C • EPA 25.C, TO-15 • Electrochemical Cell • NDIR • Field Only • TO-14 • TO-14 • TO-14	Every 24 Hours (up to 7 days)
Shutdown	• CH_4 • TNMOC • O_2 • CO_2 • Vacuum Flow • Benzene • Vinyl Chloride • Volatile Organics	• FID/PID • FID/PID • GEM 500 • GEM 500 • Magnahelic/Pitot tube • GC/FID • GC/FID • GC/FID	At Shutdown	• EPA 25.C • EPA 25.C, TO-15 • Electrochemical Cell • NDIR • Field Only • TO-14 • TO-14 • TO-14	One Sample (at shutdown)
Post Shutdown	• CH_4 • TNMOC • O_2 • CO_2 • Vacuum Flow • Benzene • Vinyl Chloride • Volatile Organics	• FID/PID • FID/PID • GEM 500 • GEM 500 • Magnahelic/Pitot tube • GC/FID • GC/FID • GC/FID	Daily First 3 Days; Monitor Every 3 Days for up to 14 Days	• EPA 25.C • EPA 25.C, TO-14 • Field Only • TO-14 • TO-14 • TO-14	Daily First 1-3 Days; Monitor every 3 Days for up to 14 Days

TABLE 4

SVE UNIT COMPONENT SPECIFICATIONS
WASTE DISPOSAL, INC. SUPERFUND SITE

COMPONENT	REQUIREMENTS
System Features	
Nominal Capacity	=100 scfm
Daily destruction rate of NMHC	= 100 lb
Equivalent concentration	2,000 ppmv (as TCE)
Dimensions, trailer bed layout	10' L x 5' W
Weight (typical configuration)	1,800 lb
Electric requirements Preheater	24V, 1Ø, 9 kW
Blower motor	5 hp, 240V, 1Ø, 28A (full load)
Controls	120V, 4A
Heat exchanger efficiency	55-60%
Vapor/liquid separator with explosion-proof float switch	
Catalytic Oxidizer	
Stainless steel process piping and heat exchanger	
Electric preheater	Flanged immersion type, Inconel sheath, and automatic inlet temperature control
Operating temperature (typical)	650-1000°F, high limit shutdown at 1100°F
Effluent discharge temperature	450-550°F
VOC destruction efficiency	NMHC 95-98%, Benzene >99%, Cl-VOC 95- >99%
Catalytic reactor	Flanged, removable, multi-stage, fixed bed
Catalyst volume T2HDC	0.3 cubic feet, 20,000 GHSV @ 100 scfm
#8199	0.5 cubic feet, 12,000 GHSV @ 100 scfm
Approximate weight	1,000 lb
Dimension, including clearances	90" L x 30" W x 33" H
Blower	
Type	Rotary Positive Displacement
Make and model	MD Pneumatics, Model 3206
Flow vacuum	100 scfm @ 6" Hg (=81.6" wc); vacuum up to 12" Hg can be applied without overheating
Drive motor	5 hp, 240V, 1Ø, 28A (full load)
Approximate weight	600 lb
Instruments and Process Controls	
Instruments	Vacuum indicator, inches wc Blower discharge temperature indicator Process gas flow rate indicator, scfm Temperature indicators at catalyst entry, interstage and exit
Process Controls	Flow control from 30 to 100 scfm by gas recirculation Low flow pressure limit switch Manual dilution air valve with filter/muffler Temperature indicator and controller w/autotune for reactor temperature control High and low temperature shutdown Automatic quench air valve
Options Included	
Operational	Auto restart Autodialer Hour meter Circular chart recorder Filter/coalescer in vapor/liquid separator
Aesthetic Options	Sound enclosure for Blower Trailer mounted
Particulate Filter	Removal of particulate >200 µ

TABLE 5

EXAMPLE
SVE START UP CHECKLIST

	CHECKED BY	COMMENT
<u>Start Up Checks</u>		
• Power Source Verified		
• Water Knock Out Clean/Clear		
• Particulate Filter/High Efficiency Demister Installed		
• Pressure/Vacuum Indicators		
- Installed		
- Calibrated		
• Temperature Gauges		
- Installed/Operation		
- Calibrated		
• Sample Ports Operational		
• Piping/Connections		
- Visual Inspection/Leak Identification		
• Gas Treatment System		
- Makeup Gas Supply Fill		
- Instrumentation Operational/Calibrated		
<u>Start Up Procedure</u>		
• Start Up		
- Energize Blower/Treatment Unit		
- Set Initial Vacuum at 10" wc		
- Check System for Blockages, Leaks		
- Test Operational Controls and Valves		
- Test Well Controls and Valves		
- Increase Blower Vacuum Slowly to Maximum ($\simeq$ 160 in wc) and Check Connections/Operations		
<u>Operations</u>		
• Reduce Blower Vacuum to 20" wc		
• Open Vapor Well Valve		
• Allow System to Equilibrate		
• Conduct Start Up Sampling (as necessary)		
• Monitor Zone of Influence Wells		
• Monitor Off Gas Treatment Effluent Gas		
• Gradually Increase Blower Rate to Optimum Level (flow versus vacuum) (if necessary, add bleed in air prior to blower)		
• Record Data from SVE Unit and Monitoring Well Probes		
• Collect Samples and Monitor Conditions		
• Monitor Water Knock Out Unit, Drain if Necessary, Record Volume		
• Monitor Particulate Filter, Clean if Necessary		

TABLE 6

QA/QC REFERENCES

ACTIVITY	PROCEDURE/SOP	GENERAL SAP REFERENCE(1)	GENERAL QUALITY ASSURANCE PROJECT PLAN REFERENCE(2)	COMMENT
SVE TESTING				
• Field Parameters				
- Methane	SOP-K(3)	A.5(3)	A.5(3)	DQO Level/Field Instrumentation
- TNMOC	SOP-K	A.5	A.5	Existing QAPP Requirements Apply
- Oxygen	SOP-K	A.5	A.5	
- Carbon Dioxide	SOP-K	A.5	A.5	
- Pressure/Flow	SOP-K	A.5	A.5	
• Laboratory Parameters				Existing QAPP Requirements will be Applicable( ) see:
- Methane	A.4.3(3)	A.5.1.2(3)	A.5.1.2(3)	Table B.2 (Data Quality Objectives)
- TNMOC	A.4.3	A.5.1.2	A.5.1.2	Table B.4 (Soil Gas Quality Control Objectives)
- Benzene	A.4.3	A.5.1.2	A.5.1.2	Table B.7 (Laboratory Quality Assurance Requirements)
- Vinyl Chloride	A.4.3	A.5.1.2	A.5.1.2	Table B.8 (Field Collection Quality Assurance Requirements)
- Volatile Organic Components	A.4.3	A.5.1.2	A.5.1.2	

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(1) This provides a general reference to the relevant Sampling and Analysis Plan Section.
(2) This provides a general reference to the relevant Quality Assurance Project Plan Section.
(3) Remedial Design Activities Workplan, TRC Environmental Solutions, Inc., 1997.

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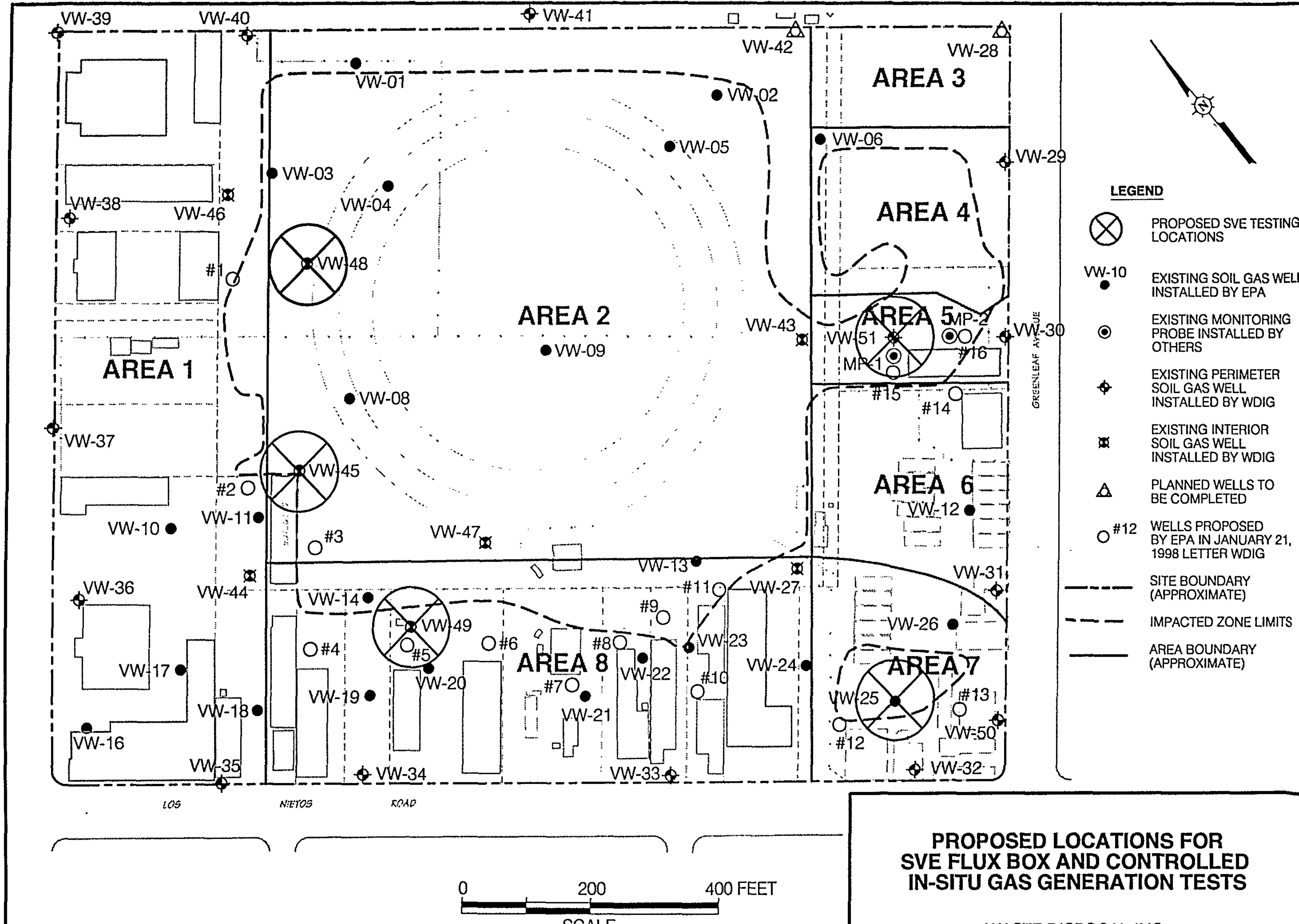


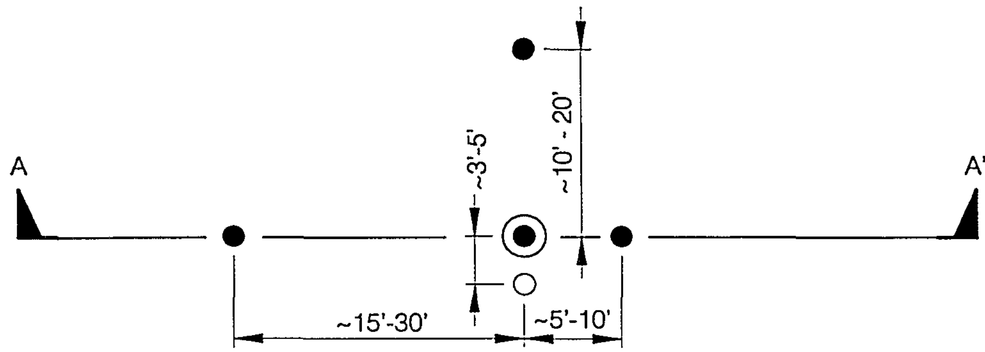
PROPOSED LOCATIONS FOR SVE FLUX BOX AND CONTROLLED IN-SITU GAS GENERATION TESTS

WASTE DISPOSAL INC.
SANTE FE SPRINGS, CALIFORNIA

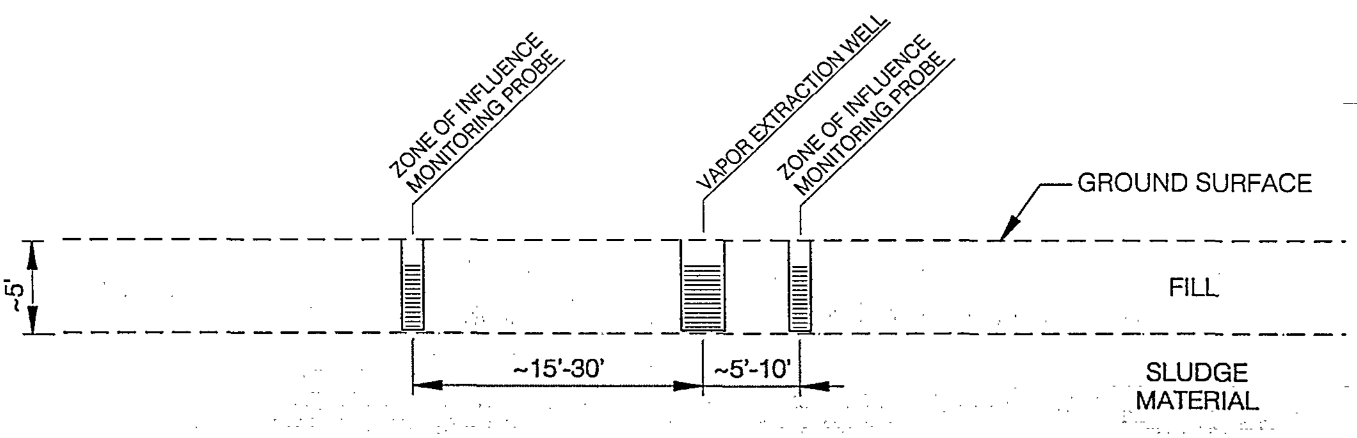
TRC

FIGURE 1

94-256TM9-07 05/28/98



PLAN VIEW



CROSS SECTION A-A'

NOT TO SCALE

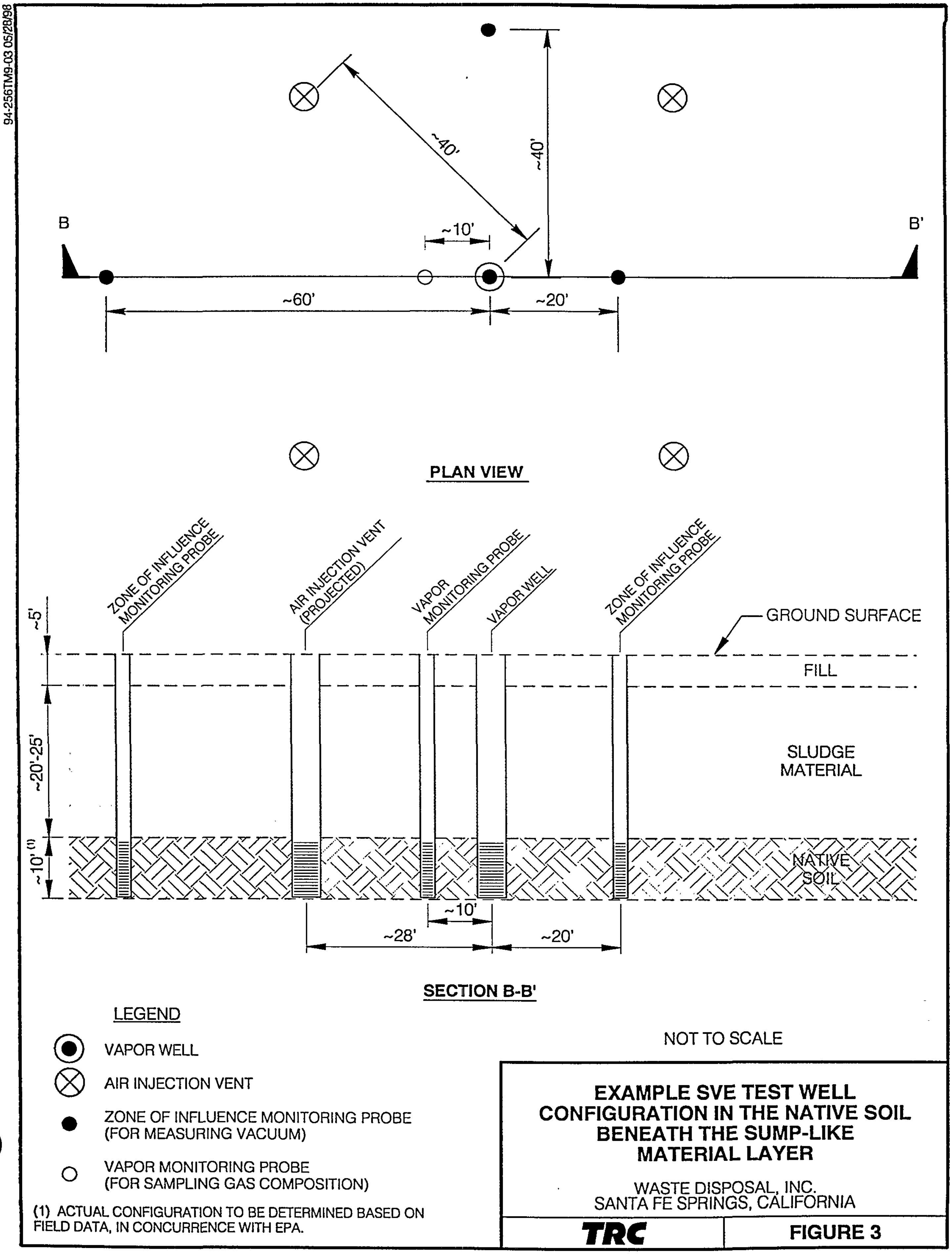
LEGEND

- ◉ VAPOR EXTRACTION WELL
- ● ZONE OF INFLUENCE MONITORING PROBE (FOR MEASURING VACUUM)
- ○ VAPOR MONITORING PROBE (FOR SAMPLING GAS COMPOSITION)

EXAMPLE SVE TEST WELL CONFIGURATION IN FILL LAYER ABOVE THE SUMP-LIKE MATERIAL LAYER

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC	FIGURE 2



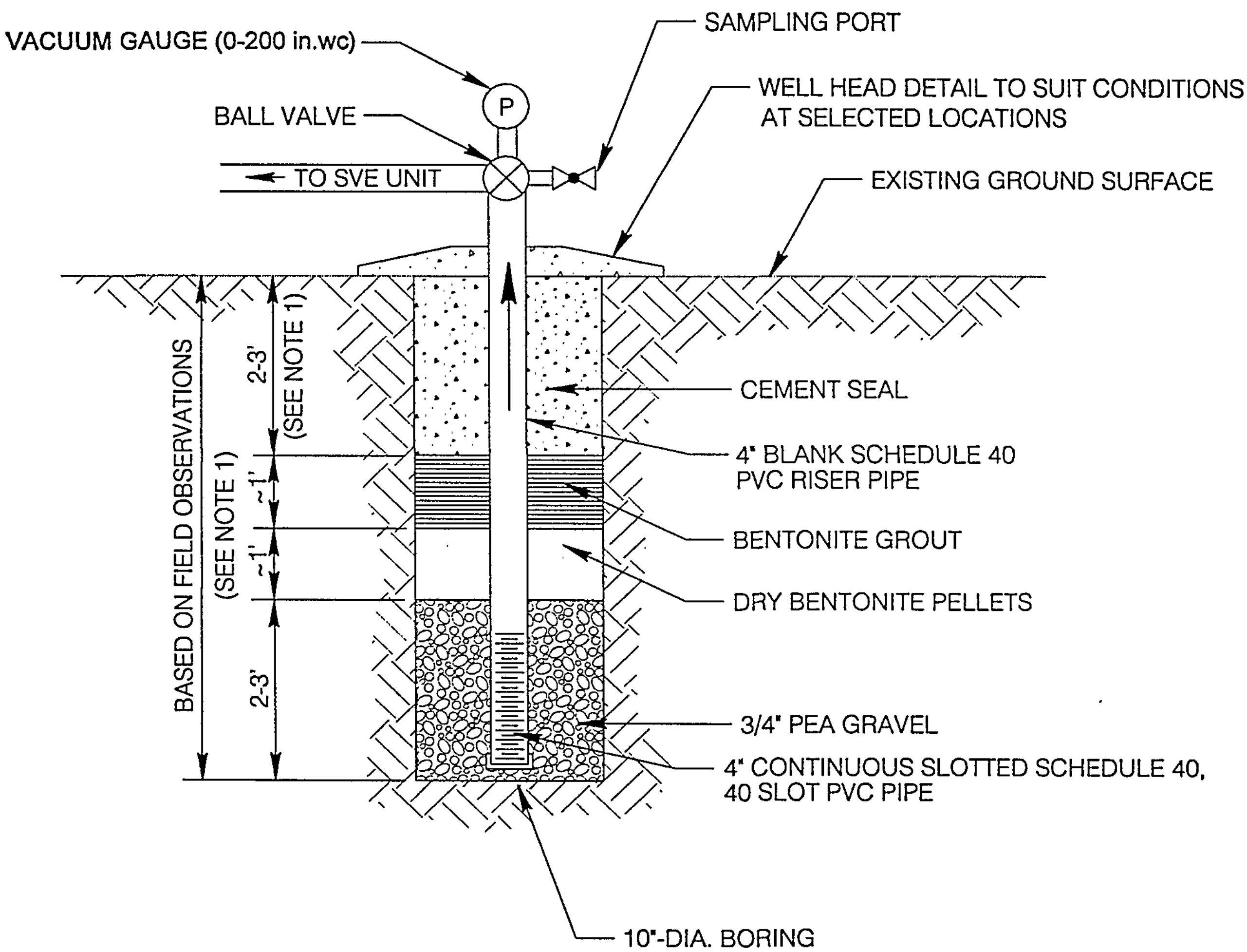
EXAMPLE SVE TEST WELL CONFIGURATION IN THE NATIVE SOIL BENEATH THE SUMP-LIKE MATERIAL LAYER

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3

94-256TM9-08 05/28/98



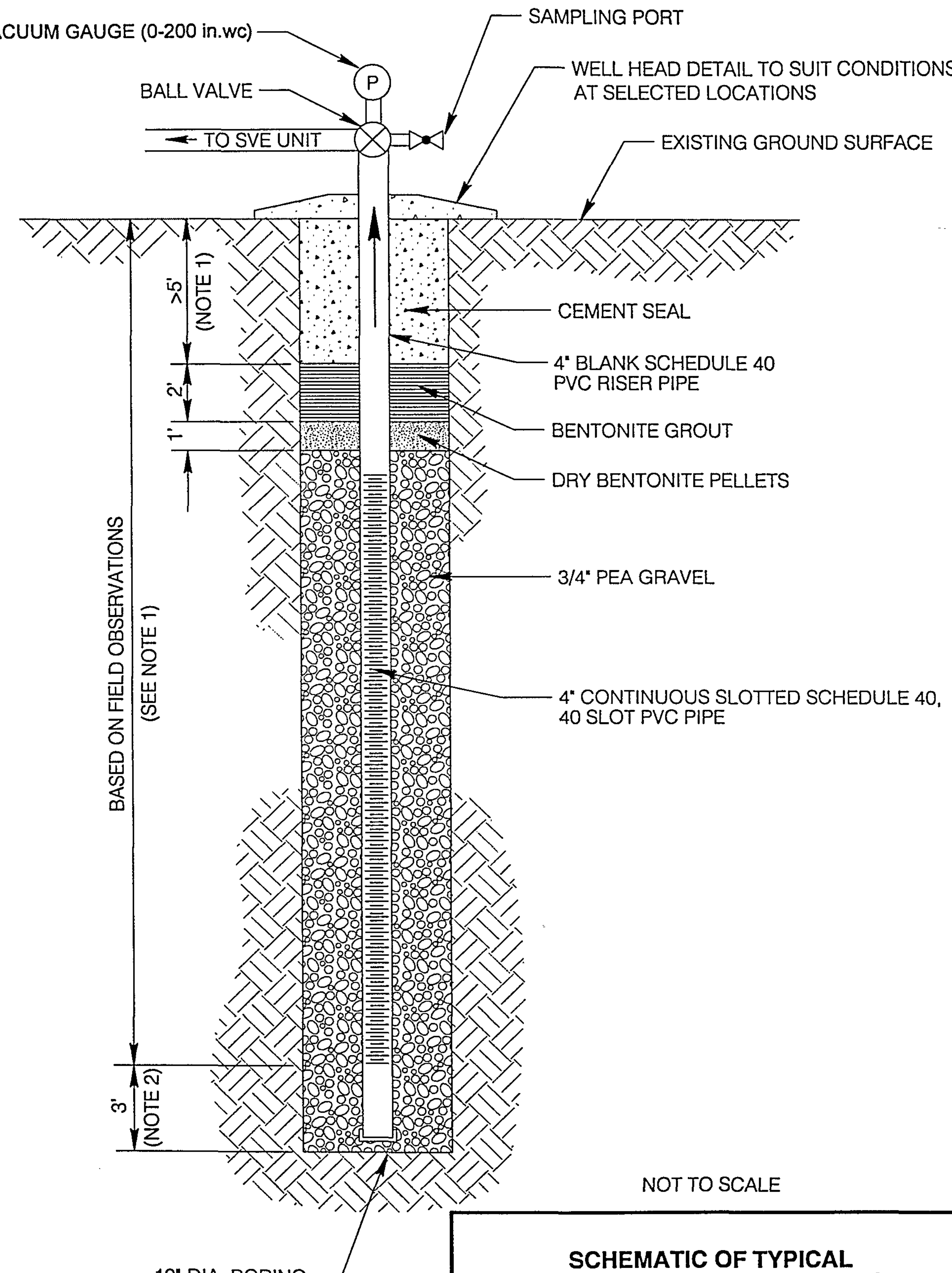
NOT TO SCALE

SCHEMATIC OF TYPICAL SVE TEST WELL CONSTRUCTION SHALLOW SOILS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC	FIGURE 4

(1) THE DEPTH OF THIS SEAL AND SCREENED INTERVAL WILL BE DETERMINED ON A WELL BY WELL BASIS BASED ON ENCOUNTERED LITHOLOGY.



NOTES:

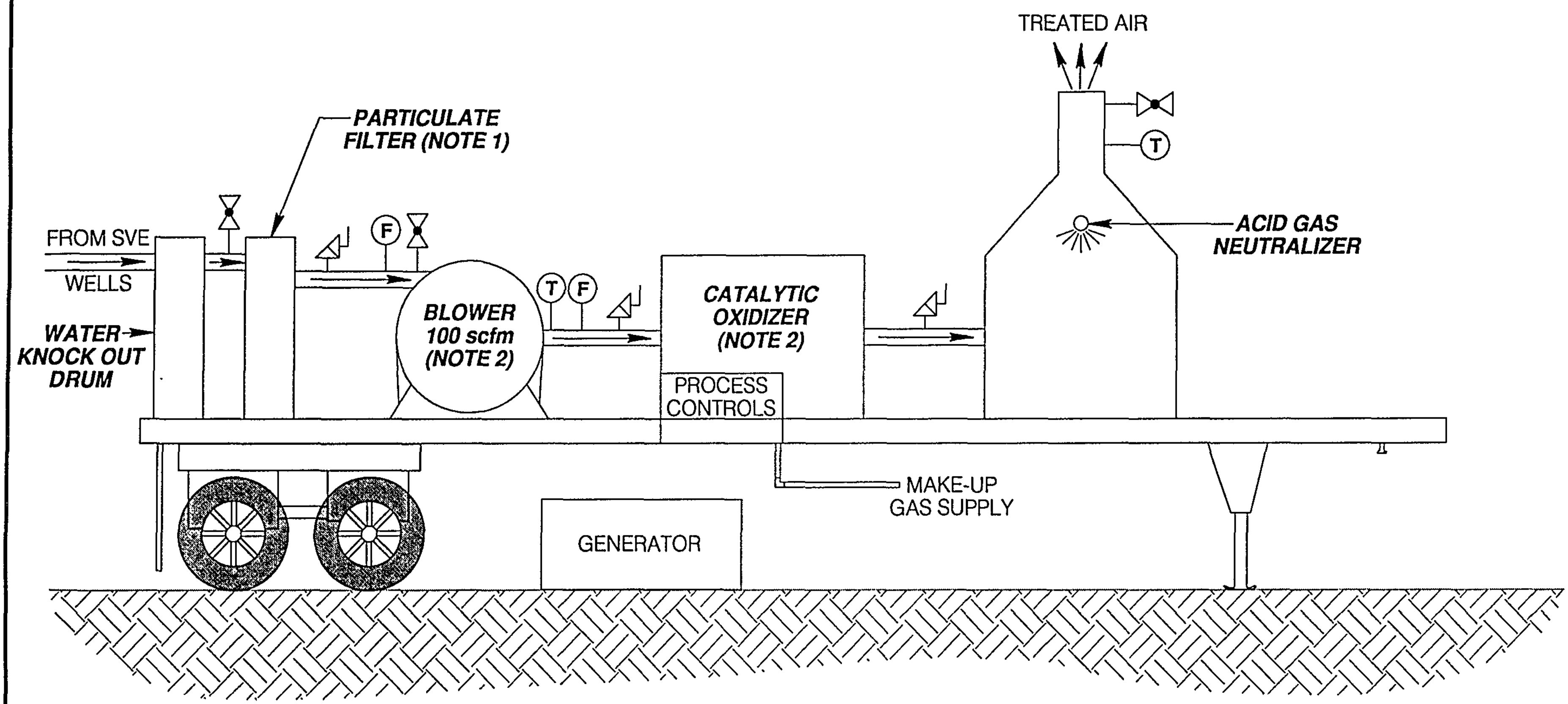
(1) THE DEPTH OF THIS SEAL AND SCREENED INTERVAL WILL BE DETERMINED ON A WELL BY WELL BASIS BASED ON ENCOUNTERED LITHOLOGY.

(2) THE BOTTOM BLANK SECTION ACTS AS A SUMP TO COLLECT LIQUID.

SCHEMATIC OF TYPICAL SVE TEST WELL CONSTRUCTION NATIVE SOIL

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | **FIGURE 5**



NOT TO SCALE

LEGEND

(F) FLOWMETER

(T) TEMPERATURE PROBE

SAMPLE PORT

PRESSURE RELIEF VALVE

NOTES:

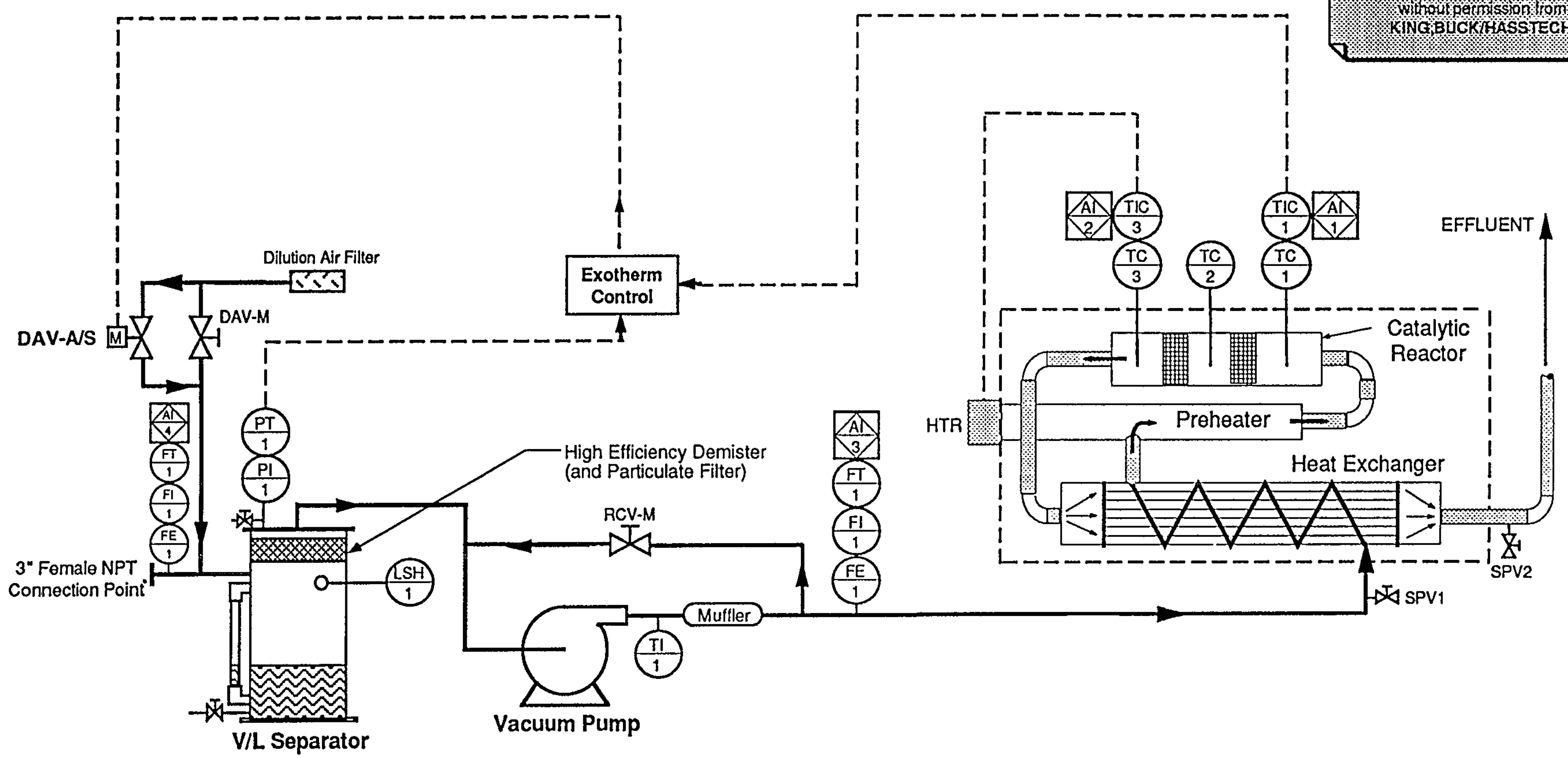
(1) PARTICULATE FILTER IS SHOWN AS A SEPARATE UNIT, BUT ITS FUNCTION CAN ALSO BE ACCOMPLISHED BY A HIGH EFFICIENCY DEMISTER INSTALLED INSIDE THE WATER KNOCKOUT DRUM.

(2) FOR SPECIFICATIONS SEE TABLE 2.

SCHEMATIC OF TYPICAL SVE TEST EQUIPMENT

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | **FIGURE 6**



Legend:

AI	Analog Input to Chart Recorder	LSH	Level Switch High
DAV-A/S	Dilution Air Control Valve - Automatic with Silencer	M	Actuator Motor
		PI	Pressure Indicator
DAV-M	Dilution Air Control Valve - Manual	PT	Pressure Transmitter
FI	Flow Indicator	RCV-M	Recirculation Control Valve - Manual
FE	Flow Sensor, Electronic	SPV1	Sample Port Valve - Influent
FT	Flow Transmitter	SPV2	Sample Port Valve - Effluent
HTR	Heater	TI	Temperature Indicator
Hx	Heat Exchanger	TC	Thermocouple
		TIC	Temperature Indicating Controller

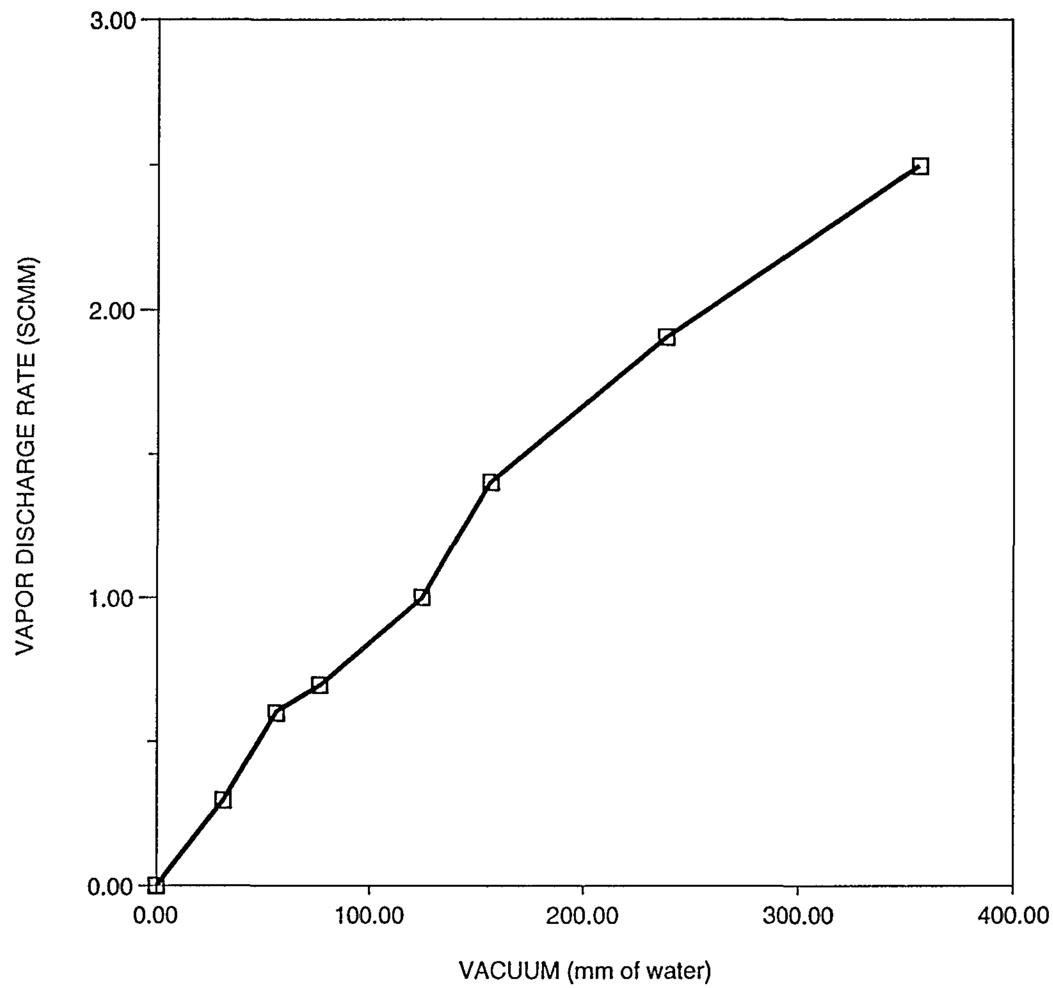
NOTE: THIS FIGURE MODIFIED BY TRC 5/28/98.

PIPING AND INSTRUMENTATION DIAGRAM
CATALYTIC OXIDIZER UNIT

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

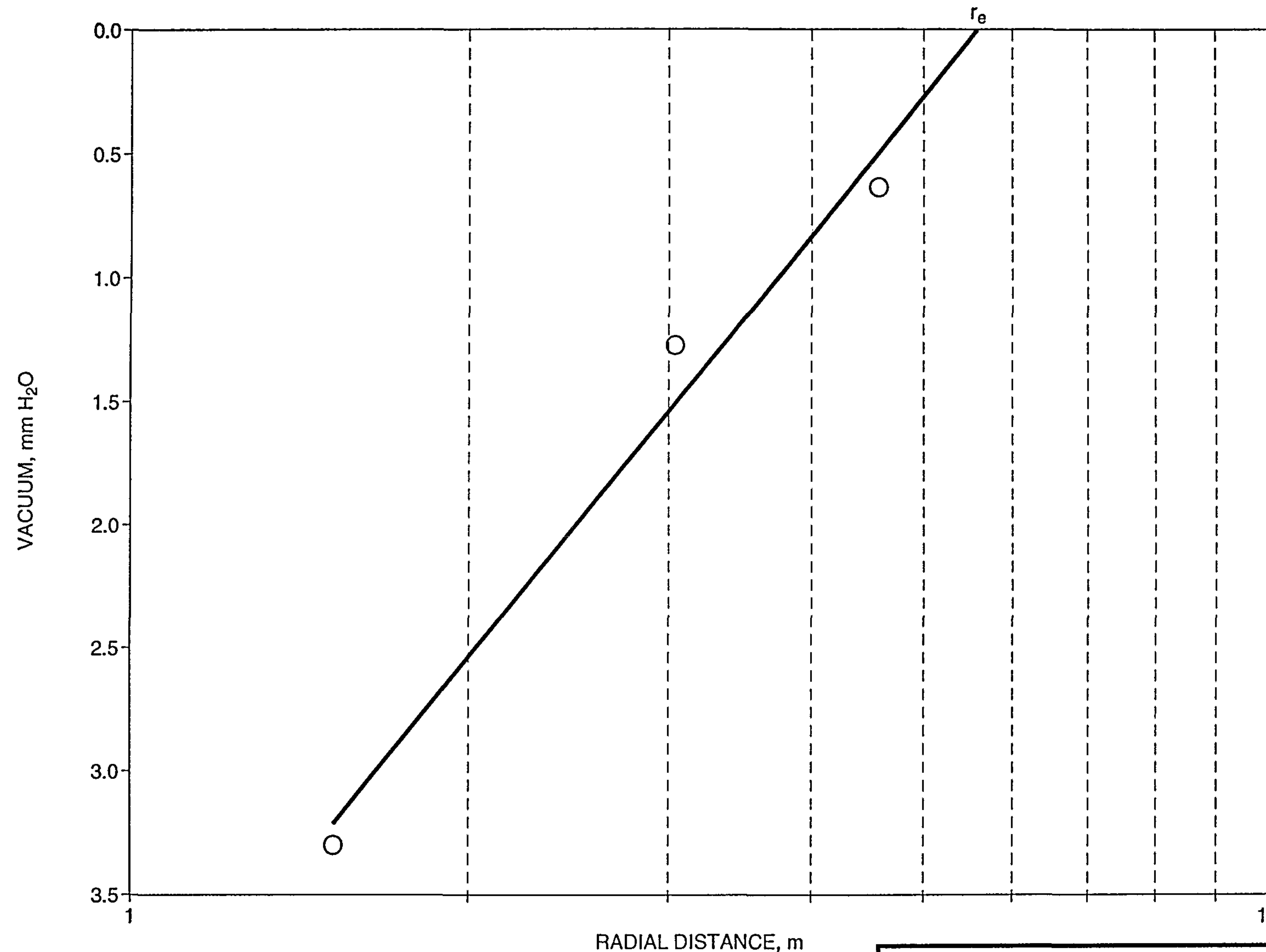
FIGURE 7



STEPPED-RATE TEST EXAMPLE FOR A VERTICAL VENT

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

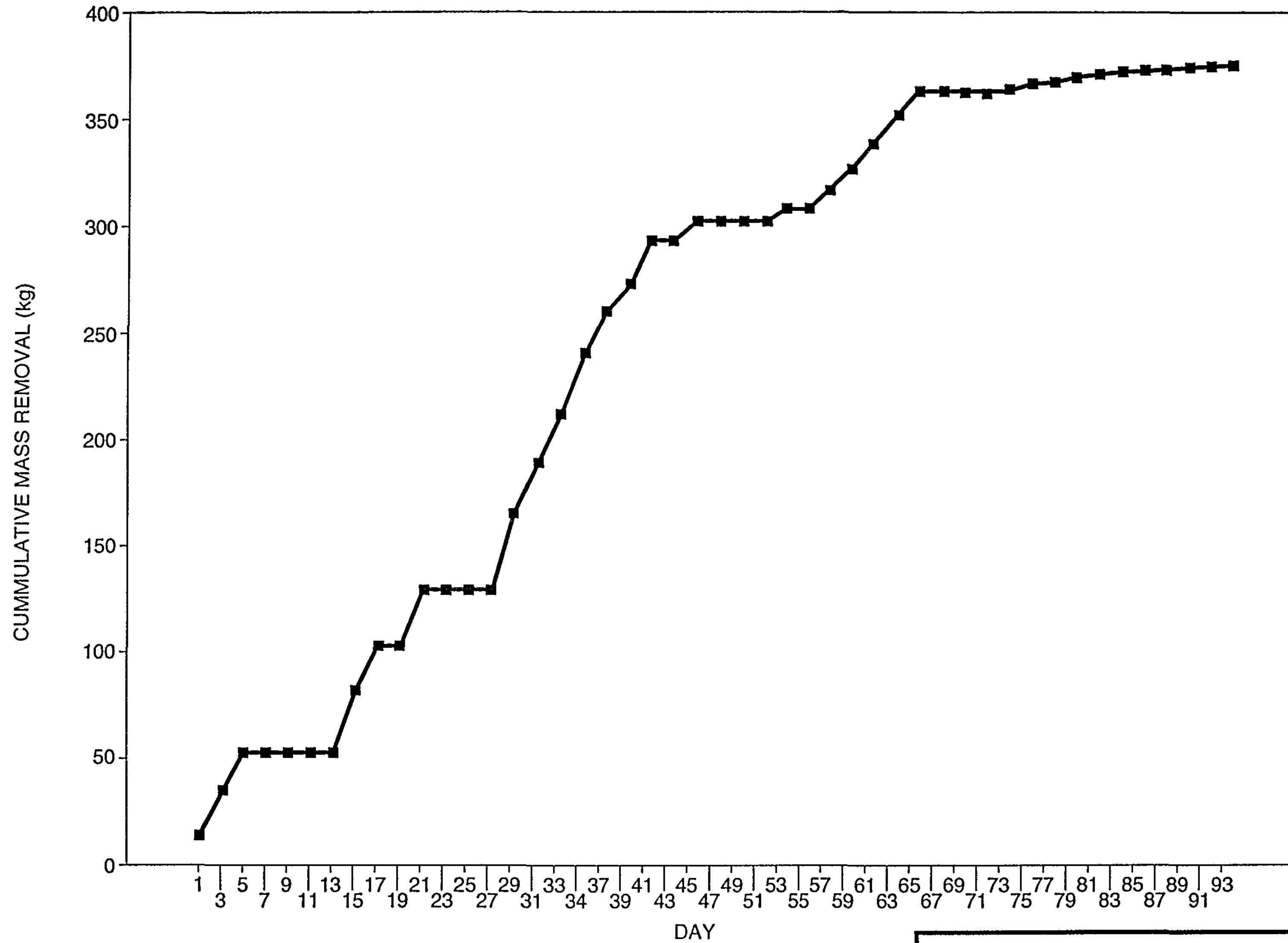
TRC | FIGURE 8



EXAMPLE
USE OF DISTANCE-DRAWDOWN
GRAPH TO DETERMINE r_e

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | **FIGURE 9**



EXAMPLE PLOT OF CUMULATIVE CONTAMINANT REMOVAL

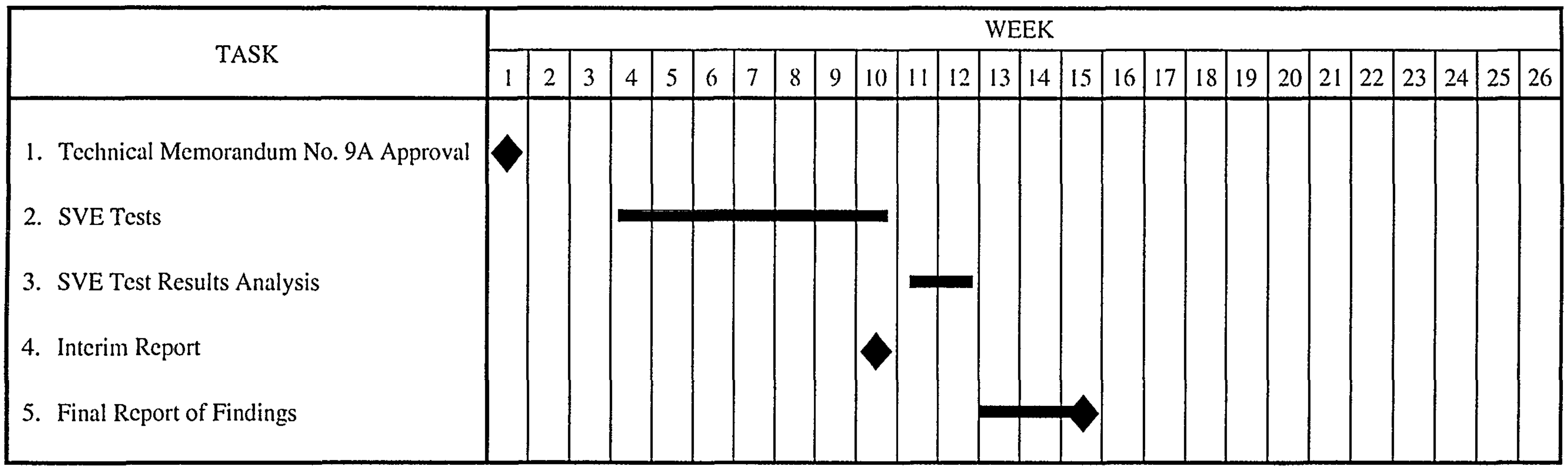
WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 10

FIGURE 11

SVE TESTING SCHEDULE
WASTE DISPOSAL, INC. SUPERFUND SITE



94-256/TMs/TM#9A (5/27/98/dh)

TRC

APPENDIX A

VAPOR WELL CONSTRUCTION DATA AND CONSTITUENT CONCENTRATIONS

TRC

TABLE 1

SITE PERIMETER COMPLIANCE STATUS
WASTE DISPOSAL, INC. SUPERFUND SITE

PERIMETER BOUNDARY	WELL NO.	MONITORING DATE	MONITORING INTERVAL (ft. bgs)	METHANE CONC. (%)	BENZENE (ppb)	VINYL CHLORIDE (ppb)	OTHER VOCs (Y/N)
Western	VW-16	2/98	4 - 34	<0.00005	<1.3	<1.6	Y
	VW-36	2/98	5 - 10 25 - 30	0.00028 <0.00005	0.61 <0.55	<0.39 <0.69	Y Y
	VW-37	2/98(1)	7 - 10 25 - 30	0 0	– –	– –	– –
	VW-38	2/98	5 - 10 29 - 34	0.0021 0.0079	<0.31 <0.31	<0.39 <0.39	Y Y
	VW-39	2/98(1)	5 - 7 25 - 30	0 0	– –	– –	– –
Northern	VW-1	2/98	5 - 35	0	<0.31	<0.39	Y
	VW-28	N/A	5 – 10 20 – 25	– –	– –	– –	– –
	VW-39	N/A	5 - 7 25 - 30	– –	– –	– –	– –
	VW-40	2/98	5 - 10 20 - 25	0.82 0	<0.31 <0.31	<0.39 <0.39	Y Y
	VW-41	2/98(1)	5 - 7 15 - 20	0 0	– –	– –	– –
	VW-42	N/A	5 – 10 25 – 30	– –	– –	– –	– –
Eastern	VW-28	N/A	5 – 10 20 – 25	– –	– –	– –	– –
	VW-29	2/98	7 - 10 18 - 23 30 - 35	0.00001 0 0	1.3 <0.31 <0.31	<0.39 <0.39 <0.39	Y Y Y
	VW-30	2/98	5 - 7 18 - 23 30 - 35	0.00004 0.92 1.1	<0.31 <0.31 <0.31	<0.39 <0.39 14	Y Y Y
	VW-31	2/98	5 - 10 25 - 30	<0.00073 <0.00072	<0.31 0.22	<0.39 <0.39	Y Y
	VW-50	2/98	5 - 8 13 - 18 30 - 35	<0.0006 <0.00052 <0.00005	0.28 0.41 <0.31	<0.39 <0.39 <0.39	Y Y Y

(1) Field screening measurements by WDIG.
--: Not analyzed.
N/A: Not Available (not yet monitored).

TABLE 1

SITE PERIMETER COMPLIANCE STATUS
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

PERIMETER BOUNDARY	WELL NO.	MONITORING DATE	MONITORING INTERVAL (ft. bgs)	METHANE CONC. (%)	BENZENE (ppb)	VINYL CHLORIDE (ppb)	OTHER VOCs (Y/N)
Southern	VW-32	2/98	4.5 - 7.5	0.00011	<1.6	<2.0	Y
			13 - 18	<0.00005	<0.31	<0.39	Y
			30 - 35	<0.00005	0.19	<0.39	Y
	VW-33	2/98	5 - 10	0.001	<0.31	<0.39	Y
			30 - 35	0.0002	1.1	<0.39	Y
	VW-34	2/98	5 - 10	0.0002	<0.31	<0.39	Y
			18 - 23	0.00007	<0.31	<0.39	Y
			35 - 40	0.1 (0)[2]	<0.31	<0.39	Y
	VW-35	2/98	5 - 10	0.00029	<3.1	<3.9	Y
			33 - 38	0.00053	<21	<26	Y

94-256/TMs/TM#9A (5/28/98/cl)

(2) Methane data collected during seal integrity testing on February 3, 1998 or February 4, 1998. Values shown in ( ).

TABLE 2

MONITORING SUMMARY - INTERIOR POINTS OUTSIDE OF IMPACTED ZONES WASTE DISPOSAL, INC. SUPERFUND SITE

SITE AREA	WELL NO.	MONITORING DATE	MONITORING INTERVAL (ft bgs)	METHANE CONC. (%)	BENZENE (ppb)	VINYL CHLORIDE (ppb)	OTHER VOCs (Y/N)
1	VW-10	2/98	5 - 35	0.56	0.98	150	Y
	VW-11	2/98	5 - 35	1.8	1.6	7.1	Y
	VW-17	2/98	5 - 35	<0.00005	6.6	<2.0	Y
	VW-18	2/98	6 - 36	0.00096	1600	<390	Y
	VW-44	2/98	5 - 7 13 - 16 25 - 30	0.0027 0.16 0.58	<3.1 1.0 <3.1	<3.9 12 50	Y Y Y
	VW-46	2/98	4.5 - 6.5 12 - 15 22 - 27	– – –	– <0.31 <0.31	– <0.39 <0.39	– Y Y
2	None						
3	None						
4	None						
5	VW-12	2/98	5 - 34	0.00012	<0.31	<0.39	Y
6	VW-26	2/98	4 - 34	0.00089	<0.31	<0.39	Y
8	VW-19	N/A	6 - 36	–	–	–	–
	VW-20	2/98	5.5 - 35.5	<0.00005	<1.3	<1.6	Y
	VW-21	2/98	6 - 36	0.000046	<1.6	<2.0	Y
	VW-22	2/98	5 - 35	0.000084	<6.3	<7.8	Y
	VW-23	2/98	6 - 36	0.42	1.1	35	Y
	VW-24	2/98	5 - 35	0.00005	0.39	<0.39	Y
	VW-27	2/98	6 - 9 16 - 19 28 - 33	0 (0)[1] 0 (0)[1] 0	– 1.0 –	– <1.6 –	– Y Y
	VW-49	2/98	5 - 10 15 - 18 25 - 30	0.00026 <0.00005 <0.00005	<6.3 <6.3 1.3	<7.8 <7.8 1.6	Y Y Y

94-256/TMs/TM#9A (5/29/98/mc)

(1) Methane data collected during seal integrity testing on February 3, 1998 or February 4, 1998. Values shown in ( ).

N/A: Not Accessible for monitoring.

None: All wells in this area are in impacted materials.

TABLE 3

MONITORING SUMMARY - INTERIOR POINTS WITHIN IMPACTED ZONES WASTE DISPOSAL, INC. SUPERFUND SITE

SITE AREA	WELL NO.	MONITORING DATE	MONITORING INTERVAL (ft. bgs)	METHANE CONC. (%)	BENZENE (ppb)	VINYL CHLORIDE (ppb)	OTHER VOCs (Y/N)
1	None						
2	VW-01	2/98	5 - 35	0.00009	<1.3	<1.6	Y
	VW-02	2/98	5 - 35	3.3	<3.1	<3.9	Y
	VW-03	2/98	5 - 35	1.4	15	<.39	Y
	VW-04	2/98	6 - 23	1.3	820	<3.9	Y
	VW-05	2/98	4 - 29	1.2	<1.3	<1.6	Y
	VW-08	2/98	5 - 35	0.86	0.79	4.6	Y
	VW-09	8/97 / 9/97(1)	5 - 23	14.9 / 27.8	11047 / 9600D	1245 / <140	–
	VW-43	2/98	5 - 10 16 - 19 27 - 32	– 0.73 2.4	– <0.31 15	– 113 210	– Y Y
	VW-45	2/98	7.5 - 12.5 18.5 - 21.5 27 - 30	– 6.1 3.2	– 570 380	– 358 <0.39	– Y Y
	VW-47	2/98	4.5 - 7.5 13 - 18 26 - 30	– 0.068 0.21	– <3.1 <1.3	– <1.6 <1.6	– Y Y
	VW-48	2/98	5 - 8 12 - 17 30 - 35	0.95 4.6 3.7	2,250 6,650 12	452 <0.39 <0.39	Y Y Y
3	None						
4	VW-06	2/98	4 - 34	5.3	<13	55	N
5	MP-1	8/97 / 9/97(1)	5 15	0 / 0.2 7.9 / --	<115 / 370 3782 / --	<144 / <0.2 280 / --	Y Y
	MP-2	8/97 / 9/97(1)	5 15	0.1 / 0.1 36 / 75	256 / 410 1513 / 13000D	1039 / <1.7 <144 / <140	Y Y
	VW-51	2/98	5 - 8 13 - 18 23 - 30	4.6 3.1 4.1	– <0.31 100	– <0.39 31	– Y Y
6	None						
7	VW-25	2/98	5 - 35	50.7	220	<200	Y
8	VW-13	2/98	6 - 31	1.3	2.6	29	Y
	VW-14	2/98	5.5 - 35.5	0.72	37	370	Y
	VW-52	N/A	7 – 10 14 – 19 25 – 30	– – –	– – –	– – –	– – –
	VW-53	N/A	7 – 10 15 – 20 25 – 30	– – –	– – –	– – –	– – –

94-256/TMs/TM#9A (5/29/98/mc)

(1) Analytical laboratory results from EPA monitoring.

--: Not analyzed.
N/A: Not Available (not yet monitored).
None: These site areas do not contain monitoring wells within impacted areas.
ND: None Detected.

APPENDIX B

SCAQMD RULE 441

(Adopted May 7, 1976)

RULE 441. RESEARCH OPERATIONS

The provisions of Regulation IV except Rule 402 shall not apply to experimental research operations when the following requirements are met:

(a) The purpose of the operation is to permit investigation, experiment, or research to advance the state of knowledge or the state of the art; and

(b) The Air Pollution Control Officer has given written prior approval which shall include limitation of time.

The Air Pollution Control Officer shall not grant approval unless the operation is conducted in a manner to minimize emissions into the atmosphere to the maximum extent possible.

WASTE DISPOSAL INC.
SUPERFUND SITE

Project Coordinator

May 28, 1998 Project No. 94-256

Ms. Cynthia Wetmore
U.S. Environmental Protection Agency
75 Hawthorne Street, No. H-7-2
San Francisco, California 94105-3901

Transmittal
Technical Memorandum (TM) No. 9A
Soil Vapor Extraction Testing
Waste Disposal, Inc.

Dear Cynthia:

The purpose of this transmittal is to provide you with TM No. 9A, describing soil vapor extraction (SVE) testing to be conducted at five selected locations at the Waste Disposal, Inc. (WDI) site for specific gas parameters. This revised technical memorandum continues to add more detail on rationale, planned measurements and calculations for SVE testing, but no longer includes the proposed controlled-volume in-situ pipe test and the laboratory gas generation test. These latter two tests will be revised and presented separately in Technical Memorandum TM No. 9B. .

This revision addresses EPA's comments on TM No. 9 Revision 2.0 and the discussion among the gas subgroup participants on SVE testing. It is the WDIG's desire to initiate this test during June, 1998.

Please let us know if you have questions about this transmittal.

Sincerely,

for:

Ian Webster
WDIG Project Coordinator

IW/MG:mc
Enclosure

cc: John Wondolleck, CDM
Tim Crist, CIWMB
Roberto Puga, TRC
Dave Becker, ACOE
Theodore Tsotsis, USC
Bill Stephanatos, Weston

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

June 4, 1998

Ian Webster, Sc.D.
WDIG Project Coordinator
c/o Project Navigator, Ltd.
10530 Floral Drive
Whittier, California 90606

Subject: EPA Approval of Technical Memorandum (TM) No. 9A, Soil Vapor Extraction Testing - Waste Disposal Inc. (WDI) Superfund Site

Dear Dr. Webster:

The purpose of this letter is to provide the U.S. Environmental Protection Agency's (EPA) approval of Technical Memorandum (TM) No. 9A, Soil Vapor Extraction Testing, submitted by the Waste Disposal, Inc. Group (WDIG) on May 28, 1998. The WDIG can proceed with the initiation of the tests as soon as possible. It is EPA's understanding that some test procedures may be modified in the field. EPA requests that all changes receive verbal approval from EPA's representative in the field and that all changes are documented. Attached are some additional considerations that WDIG should discuss with EPA prior to starting the test. At a minimum, EPA expects the WDIG to collect the temperature and barometric pressure.

TM No. 9A references the WDIG March 1998 "Preliminary Site Characterization Report." Approval of TM No. 9A does not imply EPA approval of this WDIG report or any assertions in it.

The data collected during this soil vapor extraction (SVE) test should determine the necessary parameters for gas control design. In order to start these tests as soon as possible, EPA recommends the well installation be commenced the week of June 29, or as soon thereafter as possible, so that the SVE testing can start in early July. Please provide EPA at least 10 days notice regarding the actual start date so that arrangements can be made for field oversight.

If you have any questions, please contact Cynthia Wetmore at (415) 744-2234 or give me a call at (415) 744-2361.

Sincerely,

Andria Benner
Remedial Project Manager

Attachment

cc:

Pat Hotra, SCAQMD
Neal Navarro, Army Corps of Engineers
Andy Lazzaretto, City of Santa Fe Springs
Virginia Maloles, LA County DOHS
Clement Walsch, CADHS
Roberta Puga, TRC/ESI
John Wondolleck, CDM
Mark Filippini, EPA
Mike Finch, DTSC
Shelby Moore, Esq., WDIG
Tim Crist, CIWMB
Shawn Haddad, DTSC
Bill Nelson, ATSDR
Stan Smucker, Ph.D., EPA
Keith Elliott, RWQCB
Dave Becker, Army Corps of Engineers
Cynthia Wetmore, EPA
William Coakley, EPA ERT
Bill Stephanatos, Ph.D., Weston
Kathy Steuer, Esq., EPA ORC

Attachment 1

Considerations for the SVE test

1. Section 4, Evaluation and Analysis of SVE Test Data, does not present the method or reference any relevant document for performing such determination of air conductivity.

2. To avoid atmospheric air infiltration during the execution of the shallow SVE tests, WDIG may want to consider installing a liner around the SVE extraction well. A 10 to 30 mil membrane should be fine. The areal extent of the liner can be up to 60 feet from the SVE extraction well. It is possible, that if a liner is not installed, the test will short circuit to the surface air resulting in no methane readings or the methane concentrations will be very diluted.

3. The test should not be canceled without the approval of EPA.

4. WDIG should consider having liquid evacuation pumps readily available to attempt to recover the liquids at the SVE well, if necessary.

5. EPA expects WDIG to collect temperature and barometric pressure as well as the other parameters listed in Tables 1 and 3.

6. WDIG should determine what parameters should be analyzed to characterize the separator liquids.

7. WDIG should consider installing vacuum gauges on both sides of the separator and the particulate filter, to detect the vacuum losses.

8. As an alternate design to the foot of dry bentonite pellets above the filter pack in the SVE wells and then adding bentonite grout, WDIG should consider either eliminating the dry pellets (and mixing the bentonite grout rather thick so it won't infiltrate the filter pack to any degree) or hydrating the pellets with a minimal amount of water before adding the grout.

6.0

TECHNICAL MEMORANDUM NO. 10, REV. 2.0
WASTE DISPOSAL, INC. SUPERFUND SITE

SUBJECT: Additional Soil Sampling and Leachability Testing

DATE: September 2, 1998

SUBMITTED TO: Mark Filippini, U.S. EPA

PROJECT NO.: 94-256

SUBMITTED BY: Ian Webster, WDIG Project Coordinator

CC:
Andria Benner, EPA
Dave Becker, ACOE
Boone and Associates, WDIG
Bill Coakley, EPA ERT
Tim Crist, CIWMB
Mike Finch, DTSC
Les LaFountain, NCI
Ed McGovern, WESTON
Roberto Puga, Project Navigator, Ltd.
Richard Scott, TRC
Mike Skinner, WDIG
Cynthia Wetmore, EPA
John Wondolleck, CDM Federal
Ken Woodruff, WESTON

1.0 DESCRIPTION OF DESIGN MODIFICATIONS:

1. This technical memorandum (TM) No. 10, Rev. 2.0, Additional Soil Sampling and Leachability Testing, describes procedures proposed to collect and analyze fill and waste material samples by Toxicity Characteristics Leaching Procedure (TCLP) and Soluble Threshold Limit Concentration (STLC) methods. The purpose of this sampling activity is to determine the potential constituent of concern leachability of these materials from areas shown in Figure 1, for use in expanding the range of capping and excavation/disposal options for areas outside the reservoir as part of the feasibility study (FS) process.

2.0 RATIONALE FOR ADDITIONAL SAMPLING:

1. The results of the proposed analyses will be used for the following purposes:
   - Provide data for use in the FS to potentially expand the range of capping options outside the reservoir area.
   - Provide data to be used in the FS to generally refine the range of excavation and disposal options of impacted material outside the reservoir.
2. Samples were previously collected for TCLP and STLC analysis in December 1997. However, due to the unforeseen bankruptcy of the designated analytical laboratory, the TCLP and STLC data are not available. Therefore, additional samples will be collected and analyzed using the same procedures and analysis performed in December 1997.

3.0 DESCRIPTION AND PROCEDURES FOR SAMPLING AND ANALYSIS

1. Fill and waste material samples will be collected from the areas shown in Figure 1, using previously approved procedures outlined in the Revised Supplemental Field Sampling and Analysis Plan (Rev. 2) and the Revised Supplemental Quality Assurance Project Plan (Rev. 2), submitted to Environmental Protection Agency (EPA) November 17, 1997, and approved December 2, 1997.
2. Samples will be obtained by hollow-stem auger drilling using a split spoon sampler with 2-inch x 6-inch brass tube liners from the following materials:
   - Fill material (approximately 0 to 5 feet).
   - Waste material (sump-like material approximately 5 to 20 feet).

   The brass tube liners will be fitted with end caps, labeled and placed into pre-chilled coolers to prevent volatilization for delivery to the laboratory under Chain-of-Custody protocol.
3. Samples for total volatiles analysis (EPA Method 8260) will be collected using an EMCON sampler using EPA Method 5035. Those samples will be preserved using methanol as previously done during the December 1997 sampling.

4. Samples for TCLP testing for volatiles will also be collected using an EMCON sampler. The samples will be sealed and shipped to the laboratory intact. The laboratory will then prepare the TCLP extract.

5. The samples will be extracted with acetic acid and with deionized water at the laboratory using EPA Method 1311 procedures (see Attachment 1). The extracts will then be analyzed using the following EPA methods:

   - EPA Method 8260 (Volatile Organics).
   - EPA Method 8270 (Semivolatile Organics).
   - EPA Method 8081 (Pesticides and PCBs).
   - EPA Methods 6010A, 7060, 7421, 7470 and 7740 for metals.

6. The samples will also be extracted using California's CAM-WET test (CR 66699[A]), and analyzed for metals using the same EPA methods as listed above.

4.0 EVALUATION/ANALYSIS OF TCLP/STLC DATA

1. The TLCP and STLC data will be used to evaluate the potential for materials to leach from the site to the ground water. This evaluation can then be factored in the FS process to constrain the appropriate range of capping and excavate/dispose options.

5.0 SCHEDULE FOR SAMPLING

1. TM No. 10 sampling activities will be scheduled for approximately September 10, 1998. Analyses results can be expected by October 2, 1998.

6.0 AMENDMENTS TO QAPP AND FSAP TO REFLECT MODIFICATIONS

1. The following information is included in this TM to reflect the required modifications to the QAPP:

   - Table 1 provides a list of the samples to be collected, and their location.
   - Table 2 provides a list of the analyses and EPA methods to be conducted and relevant QA/QC parameters (i.e., holding times, preservation, etc.).
   - Table 3 provides a list of the required Data Quality Objectives (DQOs) for the sampling and analysis.
   - Table 4 provides a summary of the field sampling QA/QC requirements.
   - Table 5 provides the laboratory quality assurance requirements for the analysis.
   - Table 6 provides a summary of sampling and analysis plan.
   - Attachment 1 provides a copy of the TCLP and STLC Method 1311.

2. Additional QAPP or FSAP modifications are not required.

RPM APPROVAL STATUS:

BY: ____________________ **DATE:** ____________

_____ **Approved** _____ **Disapproved** _____ **Additional Information Required**

TABLE 1

SAMPLING LOCATION AND MEDIA PLAN
WASTE DISPOSAL, INC. SUPERFUND SITE

SAMPLING LOCATION	MEDIA TO BE SAMPLED	NUMBER OF SAMPLES(1)
Area 2		
• C&E Die	F, W	2
• Reservoir (one location)	F, W	2
Area 4	F, W	2
Area 5	F, W	2
Area 7	F, W	2

94-256/TM#10 (9/2/98/tm)

(1) Does not include field duplicates.

F = Fill Material (0 to 5 feet)
W = Waste Material (5 to 20 feet)

TABLE 2

SOIL ANALYSES AND QUALITY CONTROL OBJECTIVES
WASTE DISPOSAL, INC. SUPERFUND SITE

PARAMETERS	ANALYTICAL PROCEDURE (EPA METHOD NO.)	LABORATORY SPECIFIC MEASUREMENT QUALITY OBJECTIVES (MQOs)				TYPE OF CONTAINER	PRESERVATIVE	ANALYTICAL HOLDING TIMES	REMARKS
		Detection Limit (μg/Kg)	Accuracy(1) (%)	Precision(2) (%)	Completeness (%)				
METALS									
• Aluminum	6010A	10.0	80 - 120	±30	90	One 8-Ounce Amber Jar or 6" x 2" Brass Ring	None, Cool to 4°C	6 Months	
• Antimony	6010A	10,000	80 - 120	±30	90				
• Arsenic	7060	5,000	80 - 120	±30	90				
• Barium	6010A	500	80 - 120	±30	90				
• Beryllium	6010A	100	80 - 120	±30	90				
• Cadmium	6010A	1,000	80 - 120	±30	90				
• Calcium	6010A	50,000	80 - 120	±30	90				
• Cobalt	6010A	4,000	80 - 120	±30	90				
• Chromium	6010A	1,000	80 - 120	±30	90				
• Iron	6010A	4,000	80 - 120	±30	90				
• Lead	6010A	5,000	80 - 120	±30	90				
• Magnesium	7421	200	80 - 120	±30	90				
• Manganese	6010A	1,000	80 - 120	±30	90				
• Mercury	7471	100	83 - 124	±30	90				
• Nickel	7470	4,000	80 - 120	±30	90				
• Selenium	6010A	200	80 - 120	±30	90				
• Sodium	6010A	10,000	80 - 120	±30	90				
• Thallium	7740	7,000	80 - 120	±30	90				
• Vanadium	6010A	4,000	80 - 120	±30	90				
• Zinc	6010A	1,000	80 - 120	±30	90				
VOLATILE ORGANIC COMPOUNDS (VOCs)									
• 1,1,1-Trichloroethane	8260	5.0	70 - 135	±30	90	Collect using EMCON sampler	None, Cool to 4°C	7 Days to Extract, 14 Days to Analyze	
• 1,1,2,2-Tetrachloroethane	8260	5.0	71 - 105	±30	90				
• 1,1,2-Trichloroethane	8260	5.0	70 - 135	±30	90				
• 1,1-Dichloroethane	8260	5.0	68 - 133	±30	90				
• 1,1-Dichloroethene	8260	5.0	58 - 131	±30	90				
• 1,2-Dichloroethane	8260	5.0	85 - 108	±30	90				
• 1,2-Dichloropropane	8260	5.0	62 - 130	±30	90				
• 2-Butanone	8260	10	48 - 140	±30	90				
• 2-Chloroethyl Vinyl Ether	8260	10	65 - 121	±30	90				
• 2-Hexanone	8260	50	23 - 166	±30	90				
• 4-Methyl-2-Pentanone	8260	10	40 - 135	±30	90				
• Acetone	8260	5.0	62 - 148	±30	90				
• Benzene	8260	5.0	76 - 123	±30	90				
• Bromodichloromethane	8260	5.0	65 - 148	±30	90				
• Bromoform	8260	5.0	75 - 135	±30	90				
• Bromomethane	8260	5.0	67 - 129	±30	90				
• Carbon Disulfide	8260	20	32 - 180	±30	90				
• Carbon Tetrachloride	8260	5.0	70 - 140	±30	90				
• Chloroethane	8260	5.0	54 - 135	±30	90				
• Chloroform	8260	5.0	70 - 125	±30	90				
• Chloromethane	8260	5.0	40 - 136	±30	90				
• cis-1,3-Dichloropropene	8260	5.0	67 - 130	±30	90				
• 1,2, Dibromoethane	8260	5.0	64 - 140	±30	90				
• Methylene Chloride	8260	5.0	60 - 126	±30	90				

(1) Based on Matrix Spike Percent Recovery.
(2) Based on Duplicate Samples.

TRC

TABLE 2
SOIL ANALYSES AND QUALITY CONTROL OBJECTIVES
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

PARAMETERS	ANALYTICAL PROCEDURE (EPA METHOD NO.)	LABORATORY SPECIFIC MEASUREMENT QUALITY OBJECTIVES (MQOs)				TYPE OF CONTAINER	PRESERVATIVE	ANALYTICAL HOLDING TIMES	REMARKS
		Detection Limit (μg/Kg)	Accuracy[1] (%)	Precision[2] (%)	Completeness (%)				
VOLATILE ORGANIC COMPOUNDS (VOCs) (Continued)									
• Tetrachloroethene	8260	5.0	69 - 148	±30	90				
• trans-1,2-Dichloroethene	8260	5.0	67 - 130	±30	90				
• trans-1,3-Dichloropropene	8260	5.0	70 - 127	±30	90				
• Trichloroethene	8260	5.0	71 - 157	±30	90				
• Vinyl Acetate	8260	5.0	29 - 146	±30	90				
• Vinyl Chloride	8260	5.0	57 - 133	±30	90				
SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCs)									
• Acenaphthene	8270	200	56 - 136	±30	90	One 8-Ounce Amber Jar or 6" x 2" Brass Ring	None, Cool to 4°C	7 Days to Extract; 40 Days After Extraction	
• Acenaphylene	8270	200	57 - 127	±30	90				
• Anthracene	8270	200	57 - 125	±30	90				
• Benzo(a)anthracene	8270	200	44 - 138	±30	90				
• Benzo(b)fluoranthene	8270	200	24 - 131	±30	90				
• Benzo(k)fluoranthene	8270	200	39 - 142	±30	90				
• Benzo(g,h,i)perylene	8270	200	25 - 157	±30	90				
• Benzo(a)pyrene	8270	200	34 - 128	±30	90				
• bis(2-Chloroethyl)ether	8270	200	49 - 111	±30	90				
• bis(2-Chloroisopropyl)ether	8270	200	38 - 147	±30	90				
• bis(2-Ethylhexyl)phthalate	8270	400	41 - 147	±30	90				
• 4-Bromophenyl-phenylether	8270	200	59 - 122	±30	90				
• Butylbenzylphthalate	8270	200	37 - 151	±30	90				
• 4-Chloroaniline	8270	200	27 - 120	±30	90				
• 4-Chloro-3-Methylphenol	8270	200	55 - 131	±30	90				
• 2-Chloronaphthalene	8270	200	37 - 102	±30	90				
• 4-Chlorophenyl-phenylether	8270	200	59 - 124	±30	90				
• Chrysene	8270	200	43 - 147	±30	90				
• Dibenz(a,h)anthracene	8270	200	30 - 154	±30	90				
• Dibenz(a,h)acridine	8270	200	58 - 128	±30	90				
• Dibenzofuran	8270	200	54 - 128	±30	90				
• Di-n-butylphthalate	8270	200	53 - 125	±30	90				
• 1,2-Dichlorobenzene	8270	200	48 - 112	±30	90				
• 1,3-Dichlorobenzene	8270	200	48 - 112	±30	90				
• 1,4-Dichlorobenzene	8270	200	48 - 112	±30	90				
• 3,3-Dichlorobenzidine	8270	200	40 - 135	±30	90				
• 2,4-Dichlorophenol	8270	200	49 - 116	±30	90				
• Dimethylphthalate	8270	200	61 - 129	±30	90				
• 4,6-Dinitro-2-Methylphenol	8270	200	46 - 139	±30	90				
• 2,4-Dinitrophenol	8270	200	48 - 135	±30	90				
• 2,4-Dinitrotoluene	8270	200	44 - 128	±30	90				
• 2,6-Dinitrotoluene	8270	200	48 - 130	±30	90				
• Di-n-octylphthalate	8270	200	44 - 138	±30	90				
• Fluoranthene	8270	200	39 - 137	±30	90				
• Fluorene	8270	200	39 - 137	±30	90				
• Indeno(1,2,3-ad)pyrene	8270	200	25 - 162	±30	90				
• Isophorone	8270	200	40 - 120	±30	90				
• 2-Methylnaphthalene	8270	200	5 - 165	±30	90				
• 2-Methylphenol	8270	200	60 - 135	±30	90				
• 4-Methylphenol	8270	200	48 - 141	±30	90				

(1) Based on Matrix Spike Percent Recovery.
(2) Based on Duplicate Samples.

TABLE 3

DQO DEVELOPMENT PROCESS
WASTE DISPOSAL, INC. SUPERFUND SITE

ACTIVITY	SUBSURFACE SOIL AND WASTE MATERIAL SAMPLING
Objectives	Obtain additional soil chemistry data for remedial design.
Intended Data Use	Provide data for use in the FS to potentially expand the capping options outside the reservoir area. Provide data to be used in the FS to generally refine the excavation and disposal options.
Required Analytical Methods and DQO Levels	VOCs (8260) SVOC's (8270) Pesticides (8081) Metals (see Table 2) Hydrocarbons TCLP Extraction (1311) • Methods (see Table 2) • VOC's (8260) CAM-WET (CR66699[A])(1) • Metals (see Table 2) DQO Level 3(2)
Contaminants of Concern	VOCs, SVOCs, Pesticides, PCBs and Metals(3)
Required Detection Levels	VOCs(4) SVOC's(4) Pesticides(4) Metals(4) Petroleum Hydrocarbons(4)
Sampling Points	As indicated in Figure 1.
Critical Sampling	None.

94-256/TM#10 (9/2/98/im)

(1) California Waste Extraction test results will be compared to the California Soluble Threshold Limit Concentrations (STLC).
(2) DQO levels are discussed in Section B.4 of the QAPP (Rev. 2.0), August 1997.
(3) A complete list of contaminants of concern is provided in Table B.1 of the QAPP.
(4) Required detection limits are provided in Table 2 of the Revised Supplemental QAPP.

TABLE 4

FIELD COLLECTION QUALITY ASSURANCE REQUIREMENTS
WASTE DISPOSAL, INC. SUPERFUND SITE

ANALYSIS	TRIP BLANK[1]	FIELD BLANK[1]	FIELD DUPLICATE[2]	MATRIX SPIKE AND MATRIX SPIKE DUPLICATES[3]
Soil Samples				
Organics[4]	NA	NA	1 per 10 samples or 1 per sample shipment, whichever is greater	1 per 20 samples or 1 per sample shipment, whichever is greater
Inorganics[5]	NA	NA	1 per 10 samples or 1 per sample shipment, whichever is greater	1 per 20 samples or 1 per sample shipment, whichever is greater

94-256/TM#10 (8/21/98/dh)

(1) Trip blanks and field blanks are not required for soil samples.
(2) Field duplicates require an additional sample volume (see Table 2). Note that field duplicates will be labeled so the laboratory cannot determine that the sample is a field duplicate. Field duplicates will be collected as split samples from the actual sample collected.
(3) MS/MSD samples require two additional sample volumes for organic analysis. Matrix spike samples require an additional sample volume for inorganic analyses (see Table 2).
(4) Includes VOCs, SVOCs and pesticides/PCBs.
(5) Includes metals.
NA = Not Applicable

TABLE 5

LABORATORY QUALITY ASSURANCE REQUIREMENTS
SOIL AND WASTE MATERIAL ANALYSES
WASTE DISPOSAL, INC. SUPERFUND SITE

PARAMETER GROUP	CALIBRATION METHOD	CALIBRATION/QC SAMPLING FREQUENCY	ACCEPTANCE CRITERIA
Metals (Method 6010A, 7062, 7421, 7470, 7740)	Calibration Curve	At start of analysis or when continuing calibration verification standard is out of control.	Per instrument operating manual
	Initial Calibration Verification Standard	After calibration and before sample analysis	±10 percent of true value
	Calibration Blank	Every 10 samples	<Method reporting limit
	Continuing Calibration Verification Standard	Every 10 samples	±10 percent of expected value
	Instrument Blank	1 every 10 samples	<Method reporting limit
	Method Blank	1 every 20 samples	<Method reporting limit
	Laboratory Duplicate	1 every 20 samples	Precision (%) See Table 2 Accuracy (%) See Table 2 Completeness (%) See Table 2
	MS/MSD	1 every 20 samples	80 to 120 percent recovery
	Laboratory Control Sample	1 every 20 samples	80 to 120 percent recovery
Volatile Organic Compounds (Method 8260)	Calibration Curve	At start of analysis or when continuing calibration verification standard is out of control	20 percent relative standard deviation if average response factor is used.
	Initial Calibration Verification Standard	After calibration and before sample analysis	±15 percent of true value
	Calibration Blank	Every 10 samples	<Method reporting limit
	Continuing Calibration Verification Standard	Every 10 samples	±15 percent of true value
	Instrument Blank	1 every 10 samples	<Method reporting limit
	Method Blank	1 every 20 samples	<Method reporting limit
	MS/MSD and LCS	1 every 20 samples	Precision (%) 30 RPD Accuracy (%) 50 to 125 percent recovery Completeness (%) 90 percent recovery
	Surrogate Compound	Every sample	4-bromofluorobenzene 86 to 115 percent recovery α, α, α-trifluorotoluene 86 to 115 percent recovery Dibromofluoromethane 86 to 115 percent recovery

NOTE: MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample.
RPD = Relative Percent Difference.

TABLE 5

LABORATORY QUALITY ASSURANCE REQUIREMENTS
SOIL AND WASTE MATERIAL ANALYSES
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

PARAMETER GROUP	CALIBRATION METHOD	CALIBRATION/QC SAMPLING FREQUENCY	ACCEPTANCE CRITERIA
Semivolatile Organic Compounds (Method 8270)	Calibration Curve (5 point)	At start of analysis or when continuing calibration verification standard is out of control	Per method
	Initial Calibration Verification Standard	After preparation of new calibration verification standards. Standard is from an independent.	±15 percent of expected value or within limits set by method
	Calibration Blank	Every 10 samples	<Method reporting limit
	Continuing Calibration Verification Standard	Every 10 samples	±15 percent of expected value or within limits set by method
	Method Blank	1 every 20 samples	<Method reporting limit
	MS/MSD and LCS	1 every 20 samples	Precision (%) 30 RPD Accuracy (%) 50 to 125 percent recovery Completeness (%) 90 percent recovery
	Surrogate Compound	Every sample	p-Terphenyl 33 to 141 percent recovery 2,4,6-Tribromophenol 28 to 110 percent recovery Nitrobenzene-d_5 43 to 116 percent recovery 2-Fluorobiphenyl 28 to 110 percent recovery Phenol-d_6 37 to 114 percent recovery 2-Fluorophenol 31 to 110 percent recovery
Pesticides/PCBs (Method 8081)	Calibration Curve (5 point)	At start of analysis or when continuing calibration verification standard is out of control	Per method
	Initial Calibration Verification Standard	After preparation of new calibration verification standards. Standard is from an independent.	±15 percent of expected value or within limits set by method
	Calibration Blank	Every 10 samples	<Method reporting limit
	Continuing Calibration Verification Standard	Every 10 samples	±15 percent of expected value or within limits set by method
	Method Blank	1 every 20 samples	<Method reporting limit
	MS/MSD and LCS	1 every 20 samples	Precision (%) 30 RPD Accuracy (%) 50 to 125 percent recovery Completeness (%) 90 percent recovery
	Surrogate Compound	Every sample	Tetrachloro-m-xylene or decachlorobiphenyl 20 to 147 percent recovery

TABLE 6

SUMMARY OF SAMPLING AND ANALYSIS PLAN
WASTE DISPOSAL, INC. SUPERFUND SITE

ANALYSIS METHOD	NUMBER OF SAMPLES TO BE COLLECTED AND ANALYZED			
	Total Constituent Analysis	STLC Test	TCLP Testing	
			Acetic Acid (18 hours)	Deionized Water (48 hours)
8260	10[1]	10	10	10
8270	NR	10	10	10
8081	NR	10	10	10
Metals EPA Methods 6010A, 7060, 7421, 7420 and 7740	NR	10	10	10

94-256/TM#10 (9/2/98/mdh)

(1) Soil samples collected using EPA Method 5035 will be analyzed for the total VOC constituents as per EPA Method 8260.

NR = Not required.

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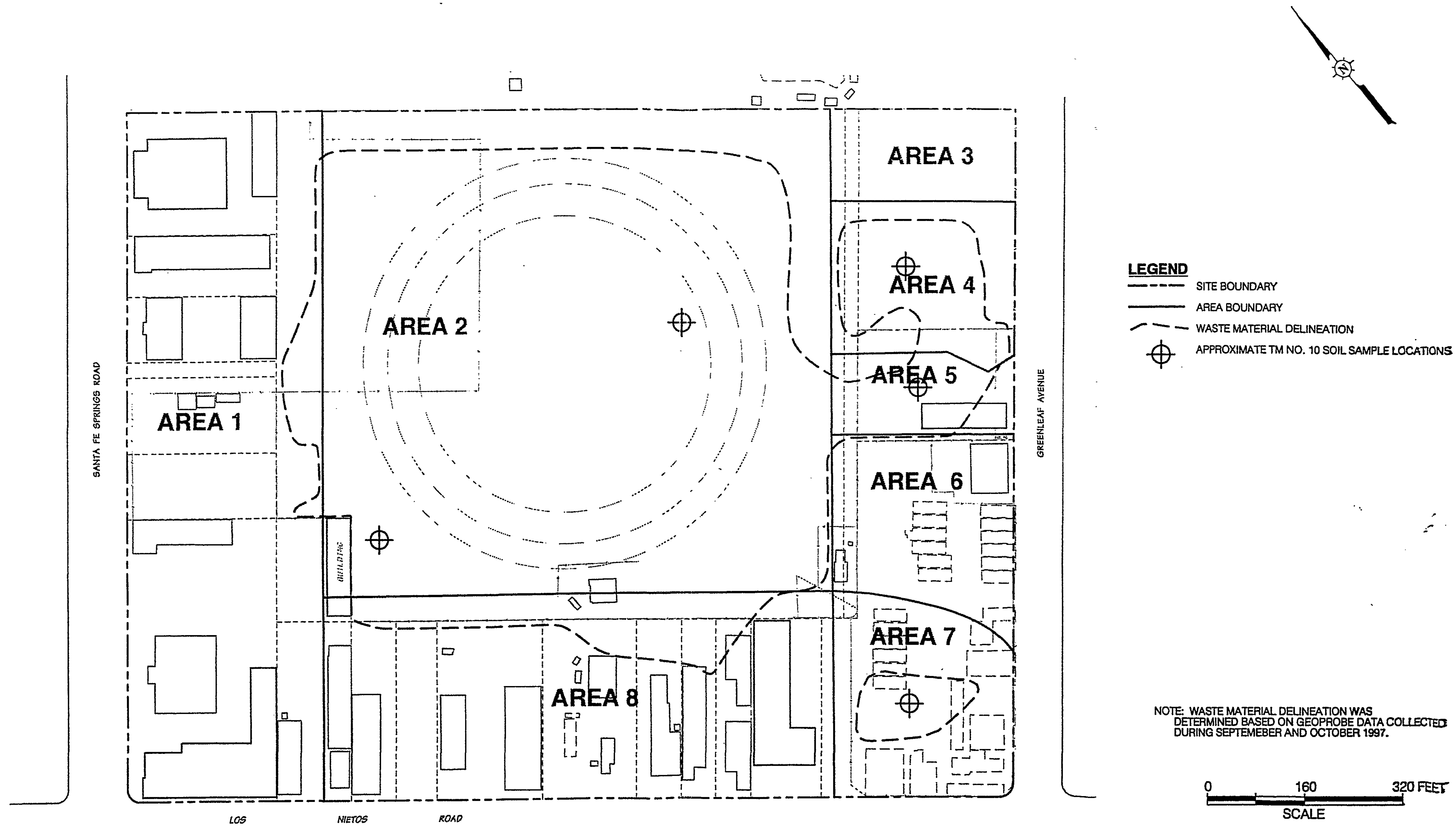


TM NO. 10
SOIL SAMPLE LOCATIONS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | **FIGURE 1**

REFERENCE: NUNEZ ENGINEERING, SURVEY DRAWING NE 97137, OCT. 31, 1997.

ATTACHMENT 1

METHOD 1311

TOXICITY CHARACTERISTIC LEACHING PROCEDURE

1.0 SCOPE AND APPLICATION

1.1 The TCLP is designed to determine the mobility of both organic and inorganic analytes present in liquid, solid, and multiphasic wastes.

1.2 If a total analysis of the waste demonstrates that individual analytes are not present in the waste, or that they are present but at such low concentrations that the appropriate regulatory levels could not possibly be exceeded, the TCLP need not be run.

1.3 If an analysis of any one of the liquid fractions of the TCLP extract indicates that a regulated compound is present at such high concentrations that, even after accounting for dilution from the other fractions of the extract, the concentration would be above the regulatory level for that compound, then the waste is hazardous and it is not necessary to analyze the remaining fractions of the extract.

1.4 If an analysis of extract obtained using a bottle extractor shows that the concentration of any regulated volatile analyte exceeds the regulatory level for that compound, then the waste is hazardous and extraction using the ZHE is not necessary. However, extract from a bottle extractor cannot be used to demonstrate that the concentration of volatile compounds is below the regulatory level.

2.0 SUMMARY OF METHOD

2.1 For liquid wastes (i.e., those containing less than 0.5% dry solid material), the waste, after filtration through a 0.6 to 0.8 μm glass fiber filter, is defined as the TCLP extract.

2.2 For wastes containing greater than or equal to 0.5% solids, the liquid, if any, is separated from the solid phase and stored for later analysis; the particle size of the solid phase is reduced, if necessary. The solid phase is extracted with an amount of extraction fluid equal to 20 times the weight of the solid phase. The extraction fluid employed is a function of the alkalinity of the solid phase of the waste. A special extractor vessel is used when testing for volatile analytes (see Table 1 for a list of volatile compounds). Following extraction, the liquid extract is separated from the solid phase by filtration through a 0.6 to 0.8 μm glass fiber filter.

2.3 If compatible (i.e., multiple phases will not form on combination), the initial liquid phase of the waste is added to the liquid extract, and these are analyzed together. If incompatible, the liquids are analyzed separately and the results are mathematically combined to yield a volume-weighted average concentration.

4.2.2 Bottle Extraction Vessel. When the waste is being evaluated using the nonvolatile extraction, a jar with sufficient capacity to hold the sample and the extraction fluid is needed. Headspace is allowed in this vessel.

The extraction bottles may be constructed from various materials, depending on the analytes to be analyzed and the nature of the waste (see Section 4.3.3). It is recommended that borosilicate glass bottles be used instead of other types of glass, especially when inorganics are of concern. Plastic bottles, other than polytetrafluoroethylene, shall not be used if organics are to be investigated. Bottles are available from a number of laboratory suppliers. When this type of extraction vessel is used, the filtration device discussed in Section 4.3.2 is used for initial liquid/solid separation and final extract filtration.

4.3 Filtration Devices: It is recommended that all filtrations be performed in a hood.

4.3.1 Zero-Headspace Extractor Vessel (ZHE): When the waste is evaluated for volatiles, the zero-headspace extraction vessel described in Section 4.2.1 is used for filtration. The device shall be capable of supporting and keeping in place the glass fiber filter and be able to withstand the pressure needed to accomplish separation (50 psi).

NOTE: When it is suspected that the glass fiber filter has been ruptured, an in-line glass fiber filter may be used to filter the material within the ZHE.

4.3.2 Filter Holder: When the waste is evaluated for other than volatile analytes, any filter holder capable of supporting a glass fiber filter and able to withstand the pressure needed to accomplish separation may be used. Suitable filter holders range from simple vacuum units to relatively complex systems capable of exerting pressures of up to 50 psi or more. The type of filter holder used depends on the properties of the material to be filtered (see Section 4.3.3). These devices shall have a minimum internal volume of 300 mL and be equipped to accommodate a minimum filter size of 47 mm (filter holders having an internal capacity of 1.5 L or greater, and equipped to accommodate a 142 mm diameter filter, are recommended). Vacuum filtration can only be used for wastes with low solids content (<10%) and for highly granular, liquid-containing wastes. All other types of wastes should be filtered using positive pressure filtration. Suitable filter holders known to EPA are shown in Table 4.

4.3.3 Materials of Construction: Extraction vessels and filtration devices shall be made of inert materials which will not leach or absorb waste components. Glass, polytetrafluoroethylene (PTFE), or type 316 stainless steel equipment may be used when evaluating the mobility of both organic and inorganic components. Devices made of high density polyethylene (HDPE), polypropylene (PP), or polyvinyl chloride (PVC) may be used only when evaluating the mobility of metals. Borosilicate glass bottles are recommended for use over other types of glass bottles, especially when inorganics are analytes of concern.

4.11 Magnetic stirrer.

5.0 REAGENTS

5.1 Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

5.2 Reagent Water. Reagent water is defined as water in which an interferant is not observed at or above the method's detection limit of the analyte(s) of interest. For nonvolatile extractions, ASTM Type II water or equivalent meets the definition of reagent water. For volatile extractions, it is recommended that reagent water be generated by any of the following methods. Reagent water should be monitored periodically for impurities.

5.2.1 Reagent water for volatile extractions may be generated by passing tap water through a carbon filter bed containing about 500 grams of activated carbon (Calgon Corp., Filtrasorb-300 or equivalent).

5.2.2 A water purification system (Millipore Super-Q or equivalent) may also be used to generate reagent water for volatile extractions.

5.2.3 Reagent water for volatile extractions may also be prepared by boiling water for 15 minutes. Subsequently, while maintaining the water temperature at 90 $\pm$ 5 degrees C, bubble a contaminant-free inert gas (e.g. nitrogen) through the water for 1 hour. While still hot, transfer the water to a narrow mouth screw-cap bottle under zero-headspace and seal with a Teflon-lined septum and cap.

5.3 Hydrochloric acid (1N), HCl, made from ACS reagent grade.

5.4 Nitric acid (1N), HNO_3, made from ACS reagent grade.

5.5 Sodium hydroxide (1N), NaOH, made from ACS reagent grade.

5.6 Glacial acetic acid, CH_3CH_2OOH, ACS reagent grade.

5.7 Extraction fluid.

5.7.1 Extraction fluid # 1: Add 5.7 mL glacial CH_3CH_2OOH to 500 mL of reagent water (See Section 5.2), add 64.3 mL of 1N NaOH, and dilute to a volume of 1 liter. When correctly prepared, the pH of this fluid will be 4.93 $\pm$ 0.05.

5.7.2 Extraction fluid # 2: Dilute 5.7 mL glacial CH_3CH_2OOH with reagent water (See Section 5.2) to a volume of 1 liter. When correctly prepared, the pH of this fluid will be 2.88 $\pm$ 0.05.

Perform preliminary TCLP evaluations on a minimum 100 gram aliquot of waste. This aliquot may not actually undergo TCLP extraction. These preliminary evaluations include: (1) determination of the percent solids (Section 7.1.1); (2) determination of whether the waste contains insignificant solids and is, therefore, its own extract after filtration (Section 7.1.2); (3) determination of whether the solid portion of the waste requires particle size reduction (Section 7.1.3); and (4) determination of which of the two extraction fluids are to be used for the nonvolatile TCLP extraction of the waste (Section 7.1.4).

7.1.1 Preliminary determination of percent solids: Percent solids is defined as that fraction of a waste sample (as a percentage of the total sample) from which no liquid may be forced out by an applied pressure, as described below.

7.1.1.1 If the waste will obviously yield no liquid when subjected to pressure filtration (i.e., is 100% solids) proceed to Section 7.1.3.

7.1.1.2 If the sample is liquid or multiphasic, liquid/solid separation to make a preliminary determination of percent solids is required. This involves the filtration device described in Section 4.3.2 and is outlined in Sections 7.1.1.3 through 7.1.1.9.

7.1.1.3 Pre-weigh the filter and the container that will receive the filtrate.

7.1.1.4 Assemble the filter holder and filter following the manufacturer's instructions. Place the filter on the support screen and secure.

7.1.1.5 Weigh out a subsample of the waste (100 gram minimum) and record the weight.

7.1.1.6 Allow slurries to stand to permit the solid phase to settle. Wastes that settle slowly may be centrifuged prior to filtration. Centrifugation is to be used only as an aid to filtration. If used, the liquid should be decanted and filtered followed by filtration of the solid portion of the waste through the same filtration system.

7.1.1.7 Quantitatively transfer the waste sample to the filter holder (liquid and solid phases). Spread the waste sample evenly over the surface of the filter. If filtration of the waste at 4 °C reduces the amount of expressed liquid over what would be expressed at room temperature then allow the sample to warm up to room temperature in the device before filtering.

NOTE: If waste material (>1% of original sample weight) has obviously adhered to the container used to transfer the sample to the filtration apparatus, determine the weight of this residue and nonvolatile TCLP is to be performed and to Section 7.3 with a fresh portion of the waste if the volatile TCLP is to be performed.

7.1.2.1 Remove the solid phase and filter from the filtration apparatus.

7.1.2.2 Dry the filter and solid phase at 100 ± 20 °C until two successive weighing yield the same value within ± 1%. Record the final weight.

NOTE: Caution should be taken to ensure that the subject solid will not flash upon heating. It is recommended that the drying oven be vented to a hood or other appropriate device.

7.1.2.3 Calculate the percent dry solids as follows:

$$\text{Percent dry solids} = \frac{\text{(Wt. of dry waste + filter) - tared wt. of filter}}{\text{Initial wt. of waste (Section 7.1.1.5 or 7.1.1.7)}} \times 100$$

7.1.2.4 If the percent dry solids is less than 0.5%, then proceed to Section 7.2.9 if the nonvolatile TCLP is to be performed, and to Section 7.3 if the volatile TCLP is to be performed. If the percent dry solids is greater than or equal to 0.5%, and if the nonvolatile TCLP is to be performed, return to the beginning of this Section (7.1) and, with a fresh portion of waste, determine whether particle size reduction is necessary (Section 7.1.3) and determine the appropriate extraction fluid (Section 7.1.4). If only the volatile TCLP is to be performed, see the note in Section 7.1.4.

7.1.3 Determination of whether the waste requires particle size reduction (particle size is reduced during this step): Using the solid portion of the waste, evaluate the solid for particle size. Particle size reduction is required, unless the solid has a surface area per gram of material equal to or greater than 3.1 cm^2, or is smaller than 1 cm in its narrowest dimension (i.e., is capable of passing through a 9.5 mm (0.375 inch) standard sieve). If the surface area is smaller or the particle size larger than described above, prepare the solid portion of the waste for extraction by crushing, cutting, or grinding the waste to a surface area or particle size as described above. If the solids are prepared for organic volatiles extraction, special precautions must be taken (see Section 7.3.6).

NOTE: Surface area criteria are meant for filamentous (e.g., paper, cloth, and similar) waste materials. Actual measurement of surface area is not required, nor is it recommended. For materials that do not obviously meet the criteria, sample specific methods would need to be developed and employed to measure the surface area. Such methodology is currently not available.

of the analyses required. If the amount of extract generated by a single TCLP extraction will not be sufficient to perform all of the analyses, more than one extraction may be performed and the extracts from each combined and aliquoted for analysis.

7.2.1 If the waste will obviously yield no liquid when subjected to pressure filtration (<u>i.e.</u>, is 100% solid, see Section 7.1.1), weigh out a subsample of the waste (100 gram minimum) and proceed to Section 7.2.9.

7.2.2 If the sample is liquid or multiphasic, liquid/solid separation is required. This involves the filtration device described in Section 4.3.2 and is outlined in Sections 7.2.3 to 7.2.8.

7.2.3 Pre-weigh the container that will receive the filtrate.

7.2.4 Assemble the filter holder and filter following the manufacturer's instructions. Place the filter on the support screen and secure. Acid wash the filter if evaluating the mobility of metals (see Section 4.4).

NOTE: Acid washed filters may be used for all nonvolatile extractions even when metals are not of concern.

7.2.5 Weigh out a subsample of the waste (100 gram minimum) and record the weight. If the waste contains <0.5% dry solids (Section 7.1.2), the liquid portion of the waste, after filtration, is defined as the TCLP extract. Therefore, enough of the sample should be filtered so that the amount of filtered liquid will support all of the analyses required of the TCLP extract. For wastes containing >0.5% dry solids (Sections 7.1.1 or 7.1.2), use the percent solids information obtained in Section 7.1.1 to determine the optimum sample size (100 gram minimum) for filtration. Enough solids should be generated by filtration to support the analyses to be performed on the TCLP extract.

7.2.6 Allow slurries to stand to permit the solid phase to settle. Wastes that settle slowly may be centrifuged prior to filtration. Use centrifugation only as an aid to filtration. If the waste is centrifuged, the liquid should be decanted and filtered followed by filtration of the solid portion of the waste through the same filtration system.

7.2.7 Quantitatively transfer the waste sample (liquid and solid phases) to the filter holder (see Section 4.3.2). Spread the waste sample evenly over the surface of the filter. If filtration of the waste at 4 °C reduces the amount of expressed liquid over what would be expressed at room temperature, then allow the sample to warm up to room temperature in the device before filtering.

NOTE: If waste material (>1% of the original sample weight) has obviously adhered to the container used to transfer the sample to the filtration apparatus, determine the weight of this residue and

7.2.11 Determine the amount of extraction fluid to add to the extractor vessel as follows:

$$\text{Weight of extraction fluid} = \frac{20 \times \text{percent solids (Section 7.1.1)} \times \text{weight of waste filtered (Section 7.2.5 or 7.2.7)}}{100}$$

Slowly add this amount of appropriate extraction fluid (see Section 7.1.4) to the extractor vessel. Close the extractor bottle tightly (it is recommended that Teflon tape be used to ensure a tight seal), secure in rotary agitation device, and rotate at 30 $\pm$ 2 rpm for 18 $\pm$ 2 hours. Ambient temperature (i.e., temperature of room in which extraction takes place) shall be maintained at 23 $\pm$ 2 °C during the extraction period.

NOTE: As agitation continues, pressure may build up within the extractor bottle for some types of wastes (e.g., limed or calcium carbonate containing waste may evolve gases such as carbon dioxide). To relieve excess pressure, the extractor bottle may be periodically opened (e.g., after 15 minutes, 30 minutes, and 1 hour) and vented into a hood.

7.2.12 Following the 18 $\pm$ 2 hour extraction, separate the material in the extractor vessel into its component liquid and solid phases by filtering through a new glass fiber filter, as outlined in Section 7.2.7. For final filtration of the TCLP extract, the glass fiber filter may be changed, if necessary, to facilitate filtration. Filter(s) shall be acid-washed (see Section 4.4) if evaluating the mobility of metals.

7.2.13 Prepare the TCLP extract as follows:

7.2.13.1 If the waste contained no initial liquid phase, the filtered liquid material obtained from Section 7.2.12 is defined as the TCLP extract. Proceed to Section 7.2.14.

7.2.13.2 If compatible (e.g., multiple phases will not result on combination), combine the filtered liquid resulting from Section 7.2.12 with the initial liquid phase of the waste obtained in Section 7.2.7. This combined liquid is defined as the TCLP extract. Proceed to Section 7.2.14.

7.2.13.3 If the initial liquid phase of the waste, as obtained from Section 7.2.7, is not or may not be compatible with the filtered liquid resulting from Section 7.2.12, do not combine these liquids. Analyze these liquids, collectively defined as the TCLP extract, and combine the results mathematically, as described in Section 7.2.14.

7.2.14 Following collection of the TCLP extract, the pH of the extract should be recorded. Immediately aliquot and preserve the extract for analysis. Metals aliquots must be acidified with nitric acid to manipulation of these materials should be done when cold (4 °C) to minimize loss of volatiles.

7.3.1 Pre-weigh the (evacuated) filtrate collection container (See Section 4.6) and set aside. If using a TEDLAR® bag, express all liquid from the ZHE device into the bag, whether for the initial or final liquid/solid separation, and take an aliquot from the liquid in the bag for analysis. The containers listed in Section 4.6 are recommended for use under the conditions stated in Sections 4.6.1 - 4.6.3.

7.3.2 Place the ZHE piston within the body of the ZHE (it may be helpful first to moisten the piston O-rings slightly with extraction fluid). Adjust the piston within the ZHE body to a height that will minimize the distance the piston will have to move once the ZHE is charged with sample (based upon sample size requirements determined from Section 7.3, Section 7.1.1 and/or 7.1.2). Secure the gas inlet/outlet flange (bottom flange) onto the ZHE body in accordance with the manufacturer's instructions. Secure the glass fiber filter between the support screens and set aside. Set liquid inlet/outlet flange (top flange) aside.

7.3.3 If the waste is 100% solid (see Section 7.1.1), weigh out a subsample (25 gram maximum) of the waste, record weight, and proceed to Section 7.3.5.

7.3.4 If the waste contains < 0.5% dry solids (Section 7.1.2), the liquid portion of waste, after filtration, is defined as the TCLP extract. Filter enough of the sample so that the amount of filtered liquid will support all of the volatile analyses required. For wastes containing $\geq$ 0.5% dry solids (Sections 7.1.1 and/or 7.1.2), use the percent solids information obtained in Section 7.1.1 to determine the optimum sample size to charge into the ZHE. The recommended sample size is as follows:

7.3.4.1 For wastes containing < 5% solids (see Section 7.1.1), weigh out a 500 gram subsample of waste and record the weight.

7.3.4.2 For wastes containing $\geq$ 5% solids (see Section 7.1.1), determine the amount of waste to charge into the ZHE as follows:

$$\text{Weight of waste to charge ZHE} = \frac{25}{\text{percent solids (Section 7.1.1)}} \times 100$$

Weigh out a subsample of the waste of the appropriate size and record the weight.

7.3.5 If particle size reduction of the solid portion of the waste was required in Section 7.1.3, proceed to Section 7.3.6. If

7.3.9 Attach the evacuated pre-weighed filtrate collection container to the liquid inlet/outlet valve and open the valve. Begin applying gentle pressure of 1-10 psi to force the liquid phase of the sample into the filtrate collection container. If no additional liquid has passed through the filter in any 2 minute interval, slowly increase the pressure in 10 psi increments to a maximum of 50 psi. After each incremental increase of 10 psi, if no additional liquid has passed through the filter in any 2 minute interval, proceed to the next 10 psi increment. When liquid flow has ceased such that continued pressure filtration at 50 psi does not result in any additional filtrate within a 2 minute period, stop the filtration. Close the liquid inlet/outlet valve, discontinue pressure to the piston, and disconnect and weigh the filtrate collection container.

NOTE: Instantaneous application of high pressure can degrade the glass fiber filter and may cause premature plugging.

7.3.10 The material in the ZHE is defined as the solid phase of the waste and the filtrate is defined as the liquid phase.

NOTE: Some wastes, such as oily wastes and some paint wastes, will obviously contain some material that appears to be a liquid. Even after applying pressure filtration, this material will not filter. If this is the case, the material within the filtration device is defined as a solid and is carried through the TCLP extraction as a solid.

If the original waste contained <0.5% dry solids (see Section 7.1.2), this filtrate is defined as the TCLP extract and is analyzed directly. Proceed to Section 7.3.15.

7.3.11 The liquid phase may now be either analyzed immediately (See Sections 7.3.13 through 7.3.15) or stored at 4 °C under minimal headspace conditions until time of analysis. Determine the weight of extraction fluid #1 to add to the ZHE as follows:

$$\text{Weight of extraction fluid} = \frac{\text{20 x percent solids (Section 7.1.1) x weight of waste filtered (Section 7.3.4 or 7.3.8)}}{100}$$

7.3.12 The following Sections detail how to add the appropriate amount of extraction fluid to the solid material within the ZHE and agitation of the ZHE vessel. Extraction fluid #1 is used in all cases (See Section 5.7).

7.3.12.1 With the ZHE in the vertical position, attach a line from the extraction fluid reservoir to the liquid inlet/outlet valve. The line used shall contain fresh extraction fluid and should be preflushed with fluid to eliminate any air pockets in the line. Release gas pressure on the ZHE piston (from the gas inlet/outlet valve), open the liquid inlet/outlet valve, filtered liquid material obtained from Section 7.3.13 and the initial liquid phase (Section 7.3.9) are collectively defined as the TCLP extract.

7.3.15 Following collection of the TCLP extract, immediately prepare the extract for analysis and store with minimal headspace at 4 °C until analyzed. Analyze the TCLP extract according to the appropriate analytical methods. If the individual phases are to be analyzed separately (i.e., are not miscible), determine the volume of the individual phases (to 0.5%), conduct the appropriate analyses, and combine the results mathematically by using a simple volume-weighted average:

$$\text{Final Analyte Concentration} = \frac{(V_1)\ (C_1) + (V_2)\ (C_2)}{V_1 + V_2}$$

where:

V_1 = The volume of the first phases (L).
C_1 = The concentration of the analyte of concern in the first phase (mg/L).
V_2 = The volume of the second phase (L).
C_2 = The concentration of the analyte of concern in the second phase (mg/L).

7.3.16 Compare the analyte concentrations in the TCLP extract with the levels identified in the appropriate regulations. Refer to Section 8.0 for quality assurance requirements.

8.0 QUALITY ASSURANCE

8.1 A minimum of one blank (using the same extraction fluid as used for the samples) must be analyzed for every 20 extractions that have been conducted in an extraction vessel.

8.2 A matrix spike shall be performed for each waste type (e.g., wastewater treatment sludge, contaminated soil, etc.) unless the result exceeds the regulatory level and the data are being used solely to demonstrate that the waste property exceeds the regulatory level. A minimum of one matrix spike must be analyzed for each analytical batch. As a minimum, follow the matrix spike addition guidance provided in each analytical method.

8.2.1 Matrix spikes are to be added after filtration of the TCLP extract and before preservation. Matrix spikes should not be added prior to TCLP extraction of the sample.

8.2.2 In most cases, matrix spikes should be added at a concentration equivalent to the corresponding regulatory level. If the analyte concentration is less than one half the regulatory level, the spike concentration may be as low as one half of the analyte concentration, but may not be not less than five times the method detection limit. In order to avoid differences in matrix effects, the matrix spikes must be the abscissa (the independent variable, x-axis) which is the concentration in the unknown.

8.4.4 Alternately, subtract the instrumental signal or external-calibration-derived concentration of the unknown (unspiked) sample from the instrumental signals or external-calibration-derived concentrations of the standard additions. Plot or subject to linear regression of the corrected instrument signals or external-calibration-derived concentrations as the dependant variable versus the independent variable. Derive concentrations for unknowns using the internal calibration curve as if it were an external calibration curve.

8.5 Samples must undergo TCLP extraction within the following time periods:

SAMPLE MAXIMUM HOLDING TIMES [Days]				
	From: Field collection To: TCLP extraction	From: TCLP extraction To: Preparative extraction	From: Preparative extraction To: Determinative analysis	Total elapsed time
Volatiles	14	NA	14	28
Semi-volatiles	14	7	40	61
Mercury	28	NA	28	56
Metals, except mercury	180	NA	180	360

NA = Not applicable

If sample holding times are exceeded, the values obtained will be considered minimal concentrations. Exceeding the holding time is not acceptable in establishing that a waste does not exceed the regulatory level. Exceeding the holding time will not invalidate characterization if the waste exceeds the regulatory level.

9.0 METHOD PERFORMANCE

9.1 Ruggedness. Two ruggedness studies have been performed to determine the effect of various perturbations on specific elements of the TCLP protocol. Ruggedness testing determines the sensitivity of small procedural variations which might be expected to occur during routine laboratory application.

9.1.1 Metals - The following conditions were used when leaching a waste for metals analysis:

9.2.1 Metals - The results of a multi-laboratory study are shown in Table 6, and indicate that a single analysis of a waste may not be adequate for waste characterization and identification requirements.

9.2.2 Semi-Volatile Organic Compounds - The results of two studies are shown in Tables 7 and 8. Single laboratory precision was excellent with greater than 90 percent of the results exhibiting an RSD less than 25 percent. Over 85 percent of all individual compounds in the multi-laboratory study fell in the RSD range of 20 - 120 percent. Both studies concluded that the TCLP provides adequate precision. It was also determined that the high acetate content of the extraction fluid did not present problems (i.e., column degradation of the gas chromatograph) for the analytical conditions used.

9.2.3 Volatile Organic Compounds - Eleven laboratories participated in a collaborative study of the use of the ZHE with two waste types which were fortified with a mixture of VOCs. The results of the collaborative study are shown in Table 9. Precision results for VOCs tend to occur over a considerable range. However, the range and mean RSD compared very closely to the same collaborative study metals results in Table 6. Blackburn and Show concluded that at the 95% level of significance: 1) recoveries among laboratories were statistically similar, 2) recoveries did not vary significantly between the two sample types, and 3) each laboratory showed the same pattern of recovery for each of the two samples.

10.0 REFERENCES

1. Blackburn, W.B. and Show, I. "Collaborative Study of the Toxicity Characteristics Leaching Procedure (TCLP)." Draft Final Report, Contract No. 68-03-1958, S-Cubed, November 1986.

2. Newcomer, L.R., Blackburn, W.B., Kimmell, T.A. "Performance of the Toxicity Characteristic Leaching Procedure." Wilson Laboratories, S-Cubed, U.S. EPA, December 1986.

3. Williams, L.R., Francis, C.W.; Maskarinec, M.P., Taylor D.R., and Rothman, N. "Single-Laboratory Evaluation of Mobility Procedure for Solid Waste." EMSL, ORNL, S-Cubed, ENSECO.

Table 2.
Suitable Rotary Agitation Apparatus[1]

Company	Location	Model No.
Analytical Testing and Consulting Services, Inc.	Warrington, PA (215) 343-4490	4-vessel extractor (DC20S) 8-vessel extractor (DC20) 12-vessel extractor (DC20B) 24-vessel extractor (DC24C)
Associated Design and Manufacturing Company	Alexandria, VA (703) 549-5999	2-vessel (3740-2-BRE) 4-vessel (3740-4-BRE) 6-vessel (3740-6-BRE) 8-vessel (3740-8-BRE) 12-vessel (3740-12-BRE) 24-vessel (3740-24-BRE)
Environmental Machine and Design, Inc.	Lynchburg, VA (804) 845-6424	8-vessel (08-00-00) 4-vessel (04-00-00)
IRA Machine Shop and Laboratory	Santurce, PR (809) 752-4004	8-vessel (011001)
Lars Lande Manufacturing	Whitmore Lake, MI (313) 449-4116	10-vessel (10VRE) 5-vessel (5VRE) 6-vessel (6VRE)
Millipore Corp.	Bedford, MA (800) 225-3384	4-ZHE or 4 2-liter bottle extractor (YT31ORAHW)

[1] Any device that rotates the extraction vessel in an end-over-end fashion at 30 $\pm$ 2 rpm is acceptable.

Table 4.
Suitable Filter Holders[1]

Company	Location	Model/ Catalogue No.	Size
Nucleopore Corporation	Pleasanton, CA (800) 882-7711	425910 410400	142 mm 47 mm
Micro Filtration Systems	Dublin, CA (800) 334-7132 (415) 828-6010	302400 311400	142 mm 47 mm
Millipore Corporation	Bedford, MA (800) 225-3384	YT30142HW XX1004700	142 mm 47 mm

[1] Any device capable of separating the liquid from the solid phase of the waste is suitable, providing that it is chemically compatible with the waste and the constituents to be analyzed. Plastic devices (not listed above) may be used when only inorganic analytes are of concern. The 142 mm size filter holder is recommended.

Table 6. Multi-Laboratory TCLP Metals, Precision

Waste	Extraction Fluid	Metal	$\bar{X}$	S	%RSD
Ammonia Lime Still Bottoms	#1	Cadmium	0.053	0.031	60
	#2		0.023	0.017	76
	#1	Chromium	0.015	0.0014	93
	#2		0.0032	0.0037	118
	#1	Lead	0.0030	0.0027	90
	#2		0.0032	0.0028	87
API/EW Mixture	#1	Cadmium	0.0046	0.0028	61
	#2		0.0005	0.0004	77
	#1	Chromium	0.0561	0.0227	40
	#2		0.105	0.018	17
	#1	Lead	0.0031	0.0031	100
	#2		0.0124	0.0136	110
Fossil Fuel Fly Ash	#1	Cadmium	0.080	0.069	86
	#2		0.093	0.067	72
	#1	Chromium	0.017	0.014	85
	#2		0.070	0.040	57
	#1	Lead	0.0087	0.0074	85
	#2		0.0457	0.0083	18
				%RSD Range = 17 - 118 Mean %RSD = 74	

NOTE: $\bar{X}$ = Mean results from 6 - 12 different laboratories
Units = mg/L
Extraction Fluid #1 = pH 4.9
#2 = pH 2.9

Table 8. Multi-Laboratory Semi-Volatiles, Precision

Waste	Compound	Extraction Fluid	$\bar{X}$	S	%RSD
Ammonia Lime	BNAs	#1	10043	7680	76.5
Still Bottoms (A)		#2	10376	6552	63.1
API/EW	BNAs	#1	1624	675	41.6
Mixture (B)		#2	2074	1463	70.5
Fossil Fuel	BNAs	#1	750	175	23.4
Fly Ash (C)		#2	739	342	46.3
					Mean %RSD = 54

NOTE: Units = μg/L
$\bar{X}$ = Mean results from 3 - 10 labs
Extraction Fluid #1 = pH 4.9
#2 = pH 2.9

%RSD Range for Individual Compounds

A, #1	0 - 113
A, #2	28 - 108
B, #1	20 - 156
B, #2	49 - 128
C, #1	36 - 143
C, #2	61 - 164

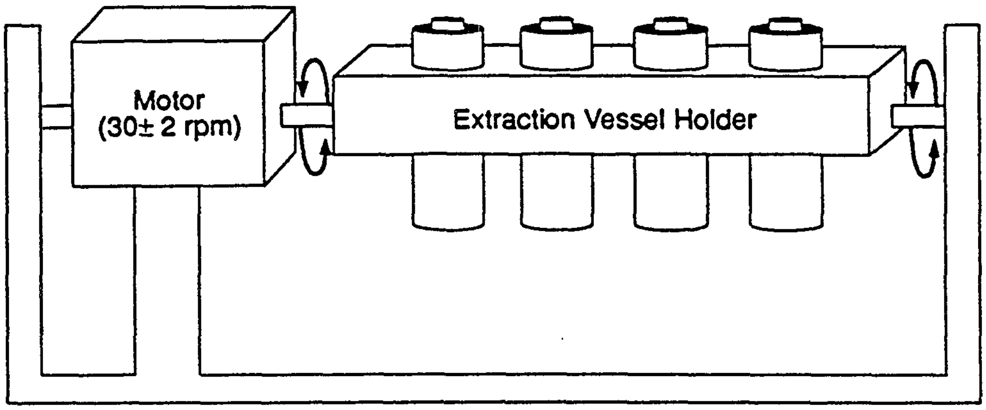


Figure 1. Rotary Agitation Apparatus

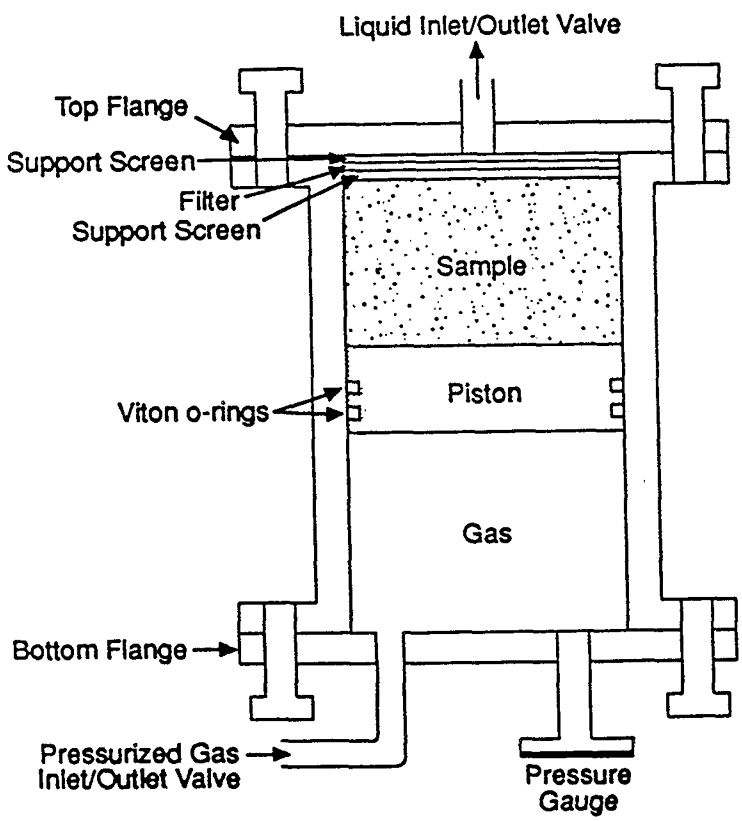
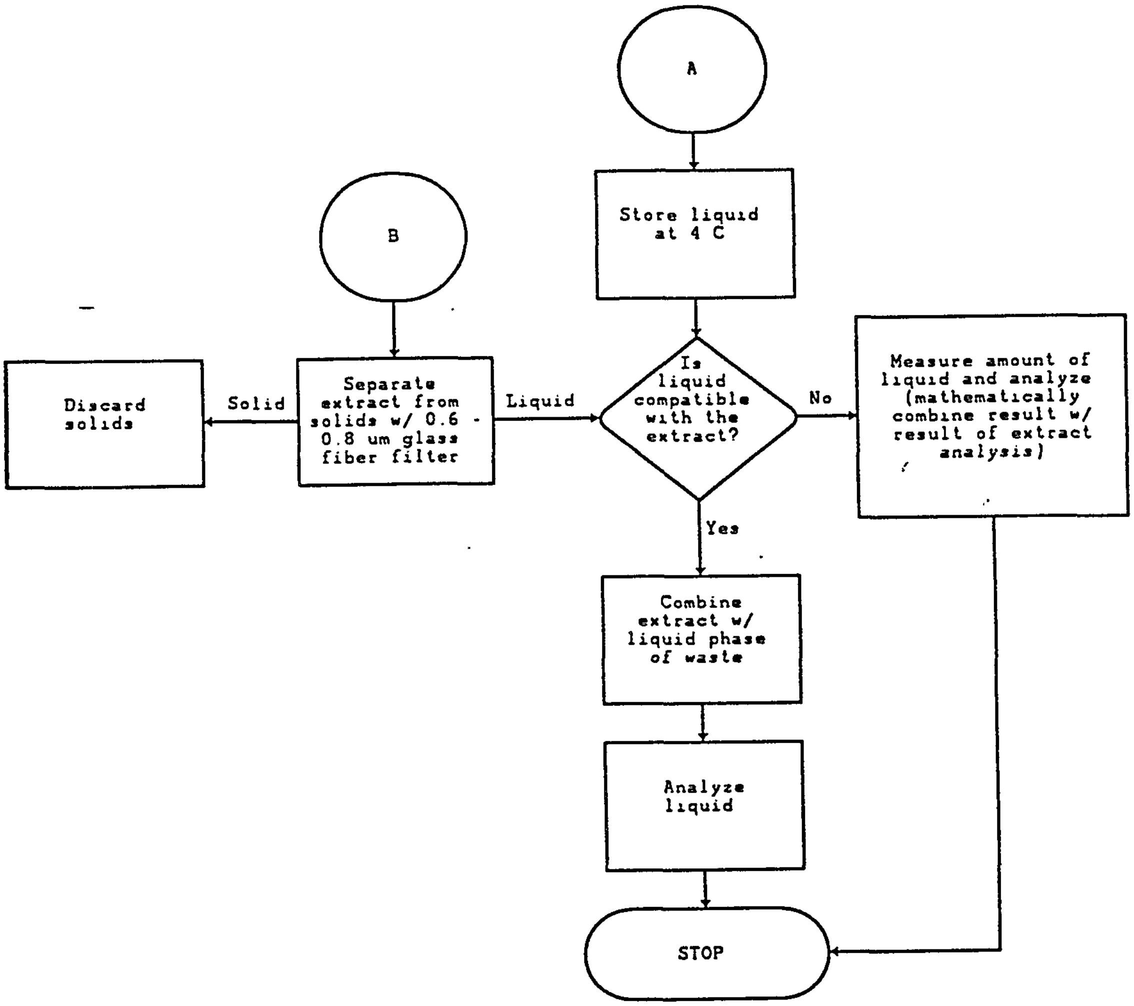


Figure 2. Zero-Headspace Extractor (ZHE)

TOXICITY CHARACTERISTIC LEACHATE PROCEDURE



[ASTM Standards are available from ASTM. 1916 Race St., Philadelphia, PA 19103] (incorporated by reference, see Section 66260.11).

NOTE: Authority cited: Sections 208, 25141 and 25159, Health and Safety Code. Reference: Section 25141, Health and Safety Code and 40 CFR Part 261 Appendix I.

HISTORY

1. New section filed 5-24-91; effective 7-1-91 (Register 91, No. 22).

Appendix II

Waste Extraction Test (WET) Procedures

(a) The Waste Extraction Test (WET) described in this appendix shall be used to determine the amount of extractable substance in a waste or other material as set forth in section 66261.24(a)(2).

(b) Except as provided in subdivision (d) of this appendix, the WET shall be carried out if the total concentration in the waste, or other material, of any substance listed in section 66261.24(a)(2) equals or exceeds the STLC value, but does not exceed the TTLC value, given for that substance. The total concentrations of substances listed in section 66261.24(a)(2) shall be determined by analysis of samples of wastes, or other materials, which have been prepared, or meet the conditions, for analysis as set forth in subdivisions (c) and (d) of this appendix. Methods used for analysis for total concentrations of substances listed in section 66261.24(a)(2) shall be those given in the following documents or alternate methods that have been approved by the Department pursuant to section 66260.21:

(1) for metal elements and their compounds, the waste shall be digested according to the indicated methods described in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 2nd edition, U.S. Environmental Protection Agency, 1982 (incorporated by reference, see section 66260.11):

(A) all listed metal elements and their compounds, except hexavalent chromium: Method 3050;

(B) hexavalent chromium: Method 3060;

(2) for all substances listed in section 66261.24(a)(2), except organic lead compounds, the methods and references in which the methods can be found are listed in Appendix III, Table 4 of this chapter;

(3) the method used for analysis of organic lead compounds is given in Appendix XI of this chapter.

(c) Samples shall be prepared for analysis for total and extractable content of substances listed in section 66261.24(a)(2)(A) and for extractable content of substances listed in section 66261.24(a)(2)(B) as follows:

(1) Type i: if the waste or other material is a millable solid, the sample shall be passed directly, or shall be milled to pass, through a No. 10 (two millimeter) standard sieve before it is analyzed. If the sample contains non-friable solid particles which do not pass directly through a No. 10 sieve and which are extraneous and irrelevant as hazardous constituents to the waste or other material, they shall be removed to the extent feasible by mechanical means and discarded. Solids which remain in the waste or other material after removal of the aforesaid extraneous particles shall be milled to pass through a No. 10 sieve and shall then be combined and mixed well with the solids which passed through the sieve without milling. The reconstituted sample shall then be analyzed as prescribed in this appendix;

(2) Type ii: if the waste or other material is a filterable mixture of liquid and solids in which the solids constitute five-tenths (0.5) percent by weight or greater of the sample, the liquid and solids shall be separated by filtration through a 0.45 micron membrane filter. The filtrate so obtained is to be designated as Initial Filtrate. Its volume is determined, and it is retained. The separated solids shall be sieved in a No. 10 sieve and any nonfriable extraneous particles of the kinds described in subdivision (c)(1) of this appendix which do not pass through the sieve shall be removed to the extent feasible by mechanical means and discarded. The solids which remain after removal of the extraneous particles shall be milled to pass through a No. 10 sieve and shall be recombined with solids which passed through the sieve without milling. This recombined solid material shall be extracted following the procedure in subdivision (g) of this appendix. A ratio of 10 milliliters of extraction solution per gram of solid shall be utilized with appropriate modifications for extraction vessel size. After completion of solids extraction, the filtered extractant is combined with Initial Filtrate, mixed thoroughly and analyzed as described in subdivision (g)(3) of this appendix;

(3) Type iii: if the waste or other material is a nonfilterable and nonmillable sludge, slurry, or oily, tarry or resinous material, it shall be analyzed as received unless it contains non-friable extraneous and irrelevant solid particles of the kinds described in subdivision (c)(1) of this appendix. If it contains such solid particles and they are of such size as not to pass through a No. 10 sieve, they shall be removed to the extent feasible by mechanical means and discarded. The remainder of the sample shall be analyzed as prescribed in this appendix;

(4) if it is necessary to dry a solid sample or the solids fraction of a sample before sieving, milling or removal of extraneous solids, or if a sample is dried prior to analysis, all weight losses due to drying shall be determined, and these losses and the conditions of drying shall be reported.

(d) Samples shall be prepared for analysis for total content of substances listed in section 66261.24(a)(2)(B) as follows:

(1) type i: if the waste or other material is a millable solid, the sample shall be passed directly, or shall be milled to pass, through a one-millimeter standard sieve before it is analyzed. If the sample contains non-friable solid particles which do not pass directly through a one-millimeter sieve and which are extraneous and irrelevant as hazardous constituents to the waste or other material, they shall be removed to the extent feasible by mechanical means and discarded. Solids which remain in the waste or other material after removal of the aforesaid extraneous particles shall be milled to pass through a one-millimeter sieve and shall then be combined and mixed well with the solids which passed through the sieve without milling. The reconstituted sample shall then be analyzed as prescribed in this appendix:

(2) type ii: if the waste or other material is a filterable mixture of liquid and solids in which the solids constitute five-tenths (0.5) percent by weight or greater of the sample, the liquid and solids shall be separated by filtration through a 0.45 micron membrane filter. The filtrate so obtained is to be designated as Initial Filtrate. Its volume is determined, and it is retained. The separated solids shall be sieved in a one-millimeter sieve and any nonfriable extraneous particles of the kinds described in subdivision (d)(1) of this appendix which do not pass through the sieve shall be removed to the extent feasible by mechanical means and discarded. The solids which remain after removal of the extraneous particles shall be milled to pass through a one-millimeter sieve and shall be recombined with solids which passed through the sieve without milling. This recombined solid material shall be extracted following the procedure in subdivision (g) of this appendix. A ratio of 10 milliliters of extraction solution per gram of solid shall be utilized with appropriate modifications for extraction vessel size. After completion of solids extraction, the filtered extractant is combined with Initial Filtrate, mixed thoroughly and analyzed as described in subdivision (9)(3) of this appendix;

(3) type iii: if the waste or other material is a nonfilterable and nonmillable sludge, slurry, or oily, tarry or resinous material, it shall be analyzed as received unless it contains non-friable extraneous and irrelevant solid particles of the kinds described in subdivision (d)(1) of this appendix. If it contains such solid particles and they are of such size as not to pass through a one-millimeter sieve, they shall be removed to the extent feasible by mechanical means and discarded. The remainder of the sample shall be analyzed as prescribed in this appendix;

(4) if it is necessary to dry a solid sample or the solids fraction of a sample before sieving, milling or removal of extraneous solids, or if a sample is dried prior to analysis, all weight losses due to drying shall be determined, and these losses and the conditions of drying shall be reported.

(e) If the waste or other material is a liquid containing less than five-tenths (0.5) percent by weight of undissolved solids, it shall not be subject to the WET procedure, but shall be analyzed directly for the substances listed in section 66261.24(a)(2). The waste shall be classified as a hazardous waste if the total concentration in the waste of any substances listed in section 66261.24(a)(2) exceeds the TTLC value given for that substance. If, however, the total concentration is less than the TTLC but exceeds the STLC when expressed on a milligrams per liter basis, the waste or other material shall be filtered through a 0.45 micron membrane filter, the solids discarded and the filtrate shall be analyzed directly for the substances listed in section 66261.24(a)(2). The waste shall be classified as a hazardous waste if the concentration in the filtrate of any of the substances listed in section 66261.24 (a)(2) exceeds the STLC value given for that substance.

(f) The WET extraction solution shall consist of 0.2 M sodium citrate at pH 5.0 + 0.1, which is prepared by titrating an appropriate amount of analytical grade citric acid in deionized water with 4.0 N NaOH, except that the extraction solution for the determination of chromium (VI) shall consist of deionized water.

(g) The extraction procedure shall be as follows:

(1) fifty grams of sample, or less if it is a type ii sample prepared pursuant to subdivision (c)(2) or (d)(2) of this appendix, obtained pursuant to subdivision (c), (d), or (e) of this appendix shall be placed in a clean polyethylene or glass container designated the Treatment, capable of physically withstanding the extraction procedure and which was rinsed previously with, in succession, an aqueous 1:1 ratio by volume nitric acid solution and deionized water. If the extract will be analyzed for any of the organic substances listed in section 66261.24(a)(2), a glass container shall be used. Furthermore, a container of the same size, shape and material shall be used for an extraction designated as the Blank, which shall be carried through the same procedure as the Treatment, but without addition of the sample;

(2) five hundred milliliters of extraction solution, or less if the waste sample is a type ii sample prepared pursuant to subdivision (c)(2) or (d)(2) of this appendix, shall be added to the Treatment and Blank containers, which shall be then fitted with covered air scrubbers extended well into the extraction solutions and flushed vigorously with nitrogen gas for 15 minutes so as to remove and exclude atmospheric oxygen from the extraction medium. If the sample is to be analyzed for any volatile substance, such as trichloroethylene, the sample shall be added after deaeration with nitrogen to avoid volatilization loss. After deaeration the containers shall be quickly sealed with tightly fitting caps and agitated, using a table shaker, an overhead stirrer or a rotary extractor, operated at a speed which shall maintain the sample in a state of vigorously agitated suspension. Required equipment is described in test method 1310 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW–846, 3rd edition, U.S. Environmental Protection Agency, 1986 (incorporated by reference, see section 66260.11). The temperature during the extraction shall be maintained between 20 and 40 degrees centigrade. After 48 hours of extracting, the contents of the Treatment and Blank containers shall be either filtered directly or centrifuged and then filtered. Filtering shall be through a medium porosity prefilter and then through a 0.45 micron membrane filter, using a clean, thick–walled suction flask. For coarser solids, prefiltration shall not be necessary. Pressure filtration shall be an optional alternative to vacuum filtration. If the extracts are first centrifuged, glass or polyethylene bottles shall be used as prescribed for extraction. For very fine solids, centrifuging at as high as 10,000 X G may be necessary. After centrifugation, the liquids shall be decanted, prefiltered if necessary, and then passed through a 0.45 micron membrane filter. All filters shall be of low and identified extractable heavy metals, fluoride and organic chemicals content;

(3) if the filtered extracts are to be analyzed only for the metal elements listed in section 66261.24(a)(2)(A), the filtered extracts from the Treatment and Blank shall be transferred to clean polyethylene bottles and acidified with nitric acid to five percent by volume acid content soon after each extract is filtered. For those wastes or waste materials classified under subdivision (c)(2) or (d)(2) of this appendix, the Treatment shall be the Initial Filtrate combined with the extract generated by the WET extraction of the initially separated solids. Similarly the Blank in this instance shall be the filtrate generated by the WET Blank accompanying the initially separated solids, to which is subsequently added a volume of deionized water equivalent to that of the Initial Filtrate. These procedures shall be followed prior to acidification of Treatment and Blank solutions with nitric acid to five percent (by volume) acid content. The bottle shall then be stored at room temperature or frozen. If the extracts are also to be analyzed for the organic substances listed in section 66261.24(a)(2)(B), or for the organic substances only, the filtered extracts shall be transferred to clean glass bottles. If the extracts are to be analyzed for fluoride, they shall be transferred to clean polyethylene bottles. These extracts, containing organic substances or flouride, shall not be acidified, but shall be frozen soon after each extract is obtained and held frozen until the day of analysis, unless the extracts are analyzed within 24 hours.

(h) Sample analysis and data treatment shall be as follows:

(1) each of the filtered extracts from the Treatment and Blank extractions shall have been acidified to five percent by volume nitric acid, and stored at room temperature or frozen in polyethylene bottles or kept frozen without addition of acid in glass bottles until the day of analysis, as prescribed. Each of the extracts shall be thoroughly mixed just prior to being individually analyzed for the substances listed in section 66261.24(a)(2) in order to determine whether the extractable concentration (EC) in the waste or other material exceeds the STLC for any of the substances listed. The extracts shall be analyzed according to the procedures identified in subdivisions (b)(2) and (b)(3) of this appendix;

(2) the net EC of a substance in the Treatment sample which is listed in section 66261.24(a)(2) shall be calculated and reported as milligrams per liter of sample (mg/l). This value is derived after subtracting the concentration of the substance in the appropriate Blank extract from that concentration determined in the Treatment extract.

Note: Authority cited: Sections 208 and 25141, Health and Safety Code. Reference: Section 25141, Health and Safety Code.

History

1. New section filed 5–24–91; effective 7–1–91 (Register 91, No. 22).

Appendix III

Chemical Analysis Test Methods

Tables 1, 2, and 3 specify the appropriate analytical procedures, described in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW–846, U.S. Environmental Protection Agency (incorporated by reference, see Section 66260.11) which shall be used to determine whether a sample contains a given Appendix VII or Appendix VIII toxic constituent. Table 4 specifies the analytical methods and references which shall be used to determine whether a sample contains a given persistent and bioaccumulative toxic substance listed in Section 66261.24 (a)(2). Table 1 identifies each Appendix VII or Appendix VIII organic constituent along with the approved measurement method. Table 2 identifies the corresponding methods for inorganic species. Table 3 summarizes the contents of SW–846 and supplies specific section and method numbers for sampling and analysis methods.

Prior to final sampling and analysis method selection the analyst should consult the specific section or method described in SW–846 for additional guidance on which of the approved methods should be employed for a specific sample analysis situation.

7.0

TECHNICAL MEMORANDUM NO. 11 - RESERVOIR AREA GRADING PLANS AND WASTE/DEBRIS MANAGEMENT

WASTE DISPOSAL, INC. SUPERFUND SITE

Prepared for

United States Environmental Protection Agency

Prepared by

TRC

Representing

Waste Disposal, Inc. Group

September 1998

TECHNICAL MEMORANDUM NO. 11 - RESERVOIR AREA GRADING PLANS AND WASTE/DEBRIS MANAGEMENT

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Waste Disposal, Inc. Group

Project No. 94-256
September 1998

TRC
21 Technology Drive
Irvine, California 92618
Telephone (949) 727-9336
Facsimile (949) 727-7399

WASTE DISPOSAL INC. SUPERFUND SITE

Project Coordinator

September 4, 1998 Project No. 94-256

Mr. Mark Filippini
Ms. Andria Benner
U.S. Environmental Protection Agency
75 Hawthorne Street, No. H-7-2
San Francisco, California 94105-3901

Transmittal
Technical Memorandum (TM) No. 11
Reservoir Area Grading Plans and Waste/Debris Management
Waste Disposal, Inc.

Dear Mr. Filippini:

This transmittal is to provide you with TM No. 11 describing the reservoir area grading plans and waste/debris management at the Waste Disposal, Inc. (WDI) site. It has been generally agreed between the Agencies and WDIG that improvements of the surface drainage over the reservoir area would eliminate or substantially decrease infiltration of stormwaters and would reduce potential flooding conditions at C&E Die/Buffalo Bullet and H&H Contractors. Therefore, the WDIG is prepared to provide an interim reservoir area grading for the purpose of stormwater drainage and infiltration control.

It is pertinent that EPA review and comment expeditiously since WDIG is working on a strict time constraint with respect to the 1998-1999 rainy season. WDIG would like to commence field activities in October 1998.

If you have any questions or comments, please call me at (562) 692-4535.

Sincerely,

Roberto Puga for

Ian Webster
WDIG Project Coordinator

IW/MG:ks
Enclosure

cc: Boone and Associates, WDIG
Bill Coakley, EPA ERT
Tim Crist, CIWMB
Mike Finch, DTSC
Ed McGovern, WESTON
Roberto Puga, Project Navigator, Ltd.
Richard Scott, TRC
Mike Skinner, WDIG
Cynthia Wetmore, EPA
John Wondolleck, CDM Federal
Ken Woodruff, WESTON

TECHNICAL MEMORANDUM NO. 11
WASTE DISPOSAL, INC. SUPERFUND SITE

SUBJECT:	Reservoir Area Grading Plans and Waste/Debris Management	**DATE:** September 4, 1998
SUBMITTED TO:	Mark Filippini, U.S. EPA Andria Benner, U.S. EPA	**PROJECT NO.:** 94-256
SUBMITTED BY:	Ian Webster, WDIG Project Coordinator	
CC:	Boone and Associates, WDIG Bill Coakley, EPA ERT Tim Crist, CIWMB Mike Finch, DTSC Ed McGovern, WESTON Roberto Puga, Project Navigator, Ltd.	Richard Scott, TRC Mike Skinner, WDIG Cynthia Wetmore, EPA John Wondolleck, CDM Federal Ken Woodruff, WESTON

1.0 DESCRIPTION OF PROPOSED ACTIVITIES:

1. This Technical Memorandum (TM) No. 11 provides the grading plans proposed to improve the storm water drainage from the reservoir to adjacent areas and structures (i.e., C&E Die/Buffalo Bullet building, H&H Contractors building, Brothers Machining property and along the school yard property). Figure 1 shows the limits of the grading activities.

2. This TM also contains the procedures that will be used to manage the disposal of various investigation-derived wastes and other miscellaneous debris from the reservoir area of the site. Figure 1 shows the locations of the wastes and debris.

2.0 RATIONALE FOR TM ACTIVITIES:

1. During the 1997 - 1998 rainy season, three businesses (C&E Die/Buffalo Bullet and H&H Contractors) were flooded due to the effects of increased precipitation caused by the El Niño weather phenomena. In addition, monitoring in the reservoir indicated liquid levels to have risen 2 to 3 feet after rain events.

2. Temporary stormwater control systems were installed adjacent to the C&E Die/Buffalo Bullet building and the H&H Contractors building to prevent surface and subsurface water flow from flooding these businesses (TRC, Site Security Plan [Rev 3.0], April 1998). Several thousand gallons of water were collected, analyzed and discharged from these systems into a storm drain located at the intersection of Los Nietos Road and Greenleaf Avenue (see Figure 1).

3. Liquid level observations within the reservoir were collected from the monitoring wells and probes installed during TM Nos. 6 and 8 field activities. After rain events, levels were measured 2 to 3 feet from the surface, up from the original depth of approximately 5 feet.

4. It has been generally agreed between the Agencies and the WDIG that improvement of the surface drainage over the reservoir area would eliminate or substantially decrease infiltration of storm waters that had in the past ponded over the reservoir, and would reduce potential flooding conditions at C&E Die/Buffalo Bullet and H&H Contractors. Additionally, the proposed earthwork would prepare the reservoir area for the potential capping that may be part of the final remedial design.

5. The investigation-derived wastes and miscellaneous debris currently stored in Areas 2 and 8 of the site would have to be moved to perform the proposed grading activities. Therefore, it would be efficient to perform the final management activities for these wastes and debris as part of the grading work.

3.0 DESCRIPTION AND PROCEDURES FOR GRADING

1. The reservoir will be regraded with a 2 percent slope, 1 percent in selected areas, to the outer toe of the reservoir berm as shown in the attached Drawings (see Attachment 1). The grading work will be completed per specifications contained in Attachment 2. Surface water flow calculations are provided in Attachment 3 to support the proposed site drainage modifications.

2. Several storm water diversion tasks will be performed at the site for surface water flow control, as described below:
   - Construct a drainage ditch parallel to the school property boundary to divert surface water flow to Areas 3 and 4.
   - Construct a drainage ditch parallel to the Brother's property along the northern fence line to divert surface water flow to Area 4.
   - Construct a drainage ditch along the east fence line of the RV storage lot to divert surface water flow to the southwest of the reservoir, and eventually to Area 1.
   - Construct a drainage ditch parallel to the C&E Die/Buffalo Bullet building to divert surface water flow to Area 8. Two additional ditches will be constructed to the north and east of the building to divert surface water flow toward Areas 1 and 8.
   - The current storm water system at C&E Die/Buffalo Bullet building will be modified by installing a 6-inch perforated PVC pipe covered by an 8 ounce geotextile fabric, drain gravel and structural fill. Prior to installing the pipe, the exterior wall of the building will be sealed with a waterproofing sealant from the base of the building's foundation up to approximately 3 feet above ground surface. The sealant will be used as an added protectant to flooding. Subsurface water will be drained to Area 8.
   - Construct a berm parallel to the north of H&H Contractors building. The purpose of the berm is to divert surface water flow away from the building towards Los Nietos Road. The berm, along with the current storm water system (i.e., a trench with a sump) will reduce potential flooding.

   Specifications to the above structures and procedures are described in Attachment 2.

3. The following additional grading activities will be required during field activities:
   - Extend or lower existing monitoring wells and probes within the reservoir to the proposed grading elevations.
   - The shaded area shown on Sheet 4 of Attachment 1 will be seeded to reduce surface erosion and for aesthetics. Additional areas may be seeded if impacted by grading activities.
   - Borrow areas will be monitored during excavation to confirm waste material is not exposed. If this does occur, the exposed waste material will be recovered with fill material.
   - EPA temporary monitoring probes within the reservoir boundary will be abandoned. The probes will be removed and the holes will be pressure grouted to the surface.

4. The investigation-derived wastes and miscellaneous debris currently stored on Areas 2 and 8 (see Figure 1) will be managed in the following manner:
   - The debris and concrete stockpiles will be transported and disposed at a Class III municipal waste landfill. Prior to removal, samples from the stockpiles will be collected and analyzed using the California CAM-WET Test for inert materials.
   - The soil cuttings from previous EPA and WDIG soils investigations and well installations contained in 55-gallon drums and three roll-off bins, shown in Figure 1, will be placed within the fill material. Placement of the soil cuttings will be performed per land disposal restrictions (Superfund Land Disposal restrictions, Guide 5, 9347.3-05FS) (see Attachment 4). The reconsolidated soils will be covered with a minimum of 2 feet of compacted fill material. The location of the trench and construction details are shown in the Drawings (see Attachment 1).
   - Removal or relocation of Baker Tanks (BT) -1 through -6 shown in Figure 1. Liquids contained in BT-1 through -3 are from TM No. 6 activities and will be handled as outlined in the TM No. 6 procedures. BT-4, -5 and -6 contain purged ground water from quarterly sampling. The purged water will be used for dust control purposes. Prior to discharging the liquids, the Baker

SUBJECT: Reservoir Area Grading Plans and Waste/Debris Management **DATE:** September 4, 1998

Tanks (BT-4, -5, and -6) will be sampled and analyzed using similar methods performed for the storm water drainage systems installed during the 1997 - 1998 rainy season (TRC, Site Security Plan [Rev. 3.0], April 1998).

- The bus on the property will be moved into the RV Storage Lot.
- Empty 55-gallon drums will be disposed and transported offsite as outlined in the Waste Material Disposal Plan.

4.0 SCHEDULE FOR REGRADING

1. TM No. 11 regrading activities will be scheduled to commence during October 1998. Attachment 5 contains a table showing the approximate time period when significant rains typically occur in the Santa Fe Springs, California area. All grading activities should be completed prior to November 1998 based on this information.
2. A preliminary reservoir area grading and waste/debris management schedule is shown in Figure 2.

LIST OF ATTACHMENTS:

1. Attachment 1: Drawings
2. Attachment 2: Specifications
3. Attachment 3: Hydraulic Calculations and Cut/Fill Calculations
4. Attachment 4: Superfund Land Disposal Restrictions; Guide 5
5. Attachment 5: Historical Rainfall Data

RPM APPROVAL STATUS:

BY: ______________________________ **DATE:** ____________________

_____ **Approved** _____ **Disapproved** _____ **Additional Information Required**

94-256GPR-01 REV. 09/04/98

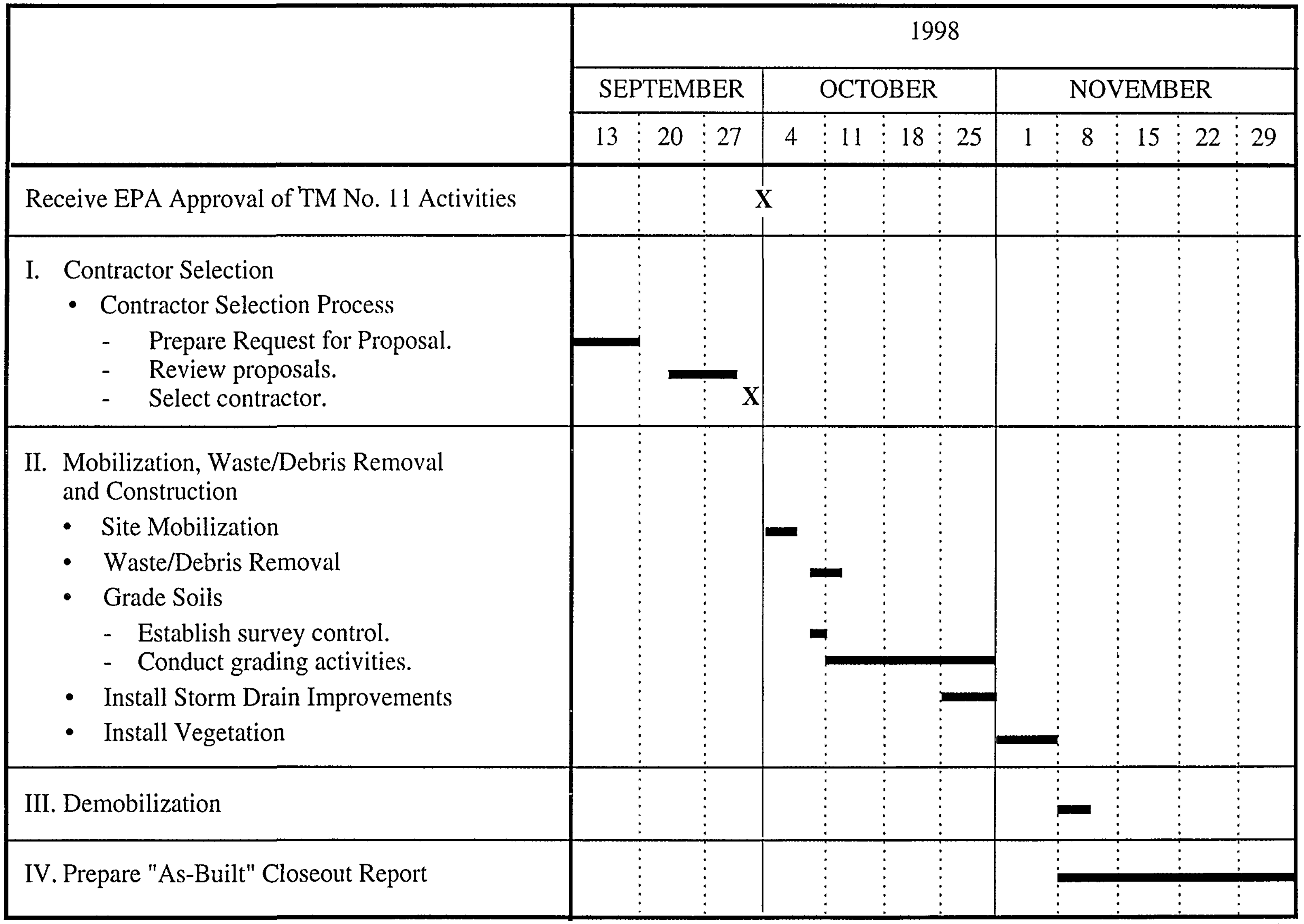
RESERVOIR AREA GRADING AND WASTE/DEBRIS MATERIAL LOCATION

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC	**FIGURE 1**

FIGURE 2

PRELIMINARY RESERVOIR AREA GRADING AND WASTE/DEBRIS MANAGEMENT SCHEDULE
WASTE DISPOSAL, INC.



94-256 (TM #11)(9/4/98/im)

LEGEND: Activity Period

X Deliverable Date

TRC

ATTACHMENT 1

DRAWINGS

PARTIALLY SCANNED
OVERSIZE ITEM (S)

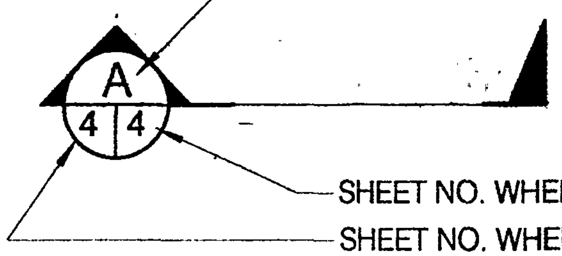
See paper copy for complete version
of oversize document(s)

(Document # 67507)

OVD - child

FORNIA 92618
27-9336

KEY



SECTION (ALPHA) OR DETAIL (NUMERIC) IDENTIFICATION

SHEET NO. WHERE SECTION OR DETAIL IS SHOWN

SHEET NO. WHERE SECTION OR DETAIL IS CALLED OUT

ABBREVIATIONS

	AC	ASPHALT CONCRETE	HP	HIGH POINT	OC	ON CENTER
ATIVE SOIL COVER	APPROX.	APPROXIMATE	INV.	INVERT	oz.	OUNCE
GE ROCK	℄	CENTER LINE	L	LENGTH	%	PERCENT
ETE	CF	CUBIC FEET	LF	LINEAL FEET	PL	PROPERTY LINE
AL GRADE	CY	CUBIC YARD	LP	LOW POINT	PVC	POLY VINYL CHLORIDE
NG	DIA.	DIAMETER	MH	MANHOLE	R	RADIUS
:	DIM.	DIMENSION	MIN.	MINIMUM	RV	RECREATIONAL VEHICLE
T CONCRETE	E	EASTING	MSL	MEAN SEA LEVEL	STD.	STANDARD
	EL.	ELEVATION	N	NORTHING	STA.	STATION
	FS	FINISHED SURFACE	NTS	NOT TO SCALE	TC	TOP OF CURB
	FL	FLOW LINE	NO.	NUMBER	TG	TOP OF GRATE
	GAL.	GALLON			TYP.	TYPICAL
	GB	GRADE BREAK				

ISSUED FOR REVIEW ONLY
NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	DRAWN BY	CHK'D BY
A	9/4/98	ISSUED FOR REVIEW	BJ	

DRAWN BY B. JONES CHECKED BY APPROVED BY

WASTE DISPOSAL INC. SUPERFUND SITE
TECHNICAL MANAGEMENT NO. 11 - RESERVOIR AREA
GRADING AND WASTE/DEBRIS MANAGEMENT
SANTA FE SPRINGS CALIFORNIA

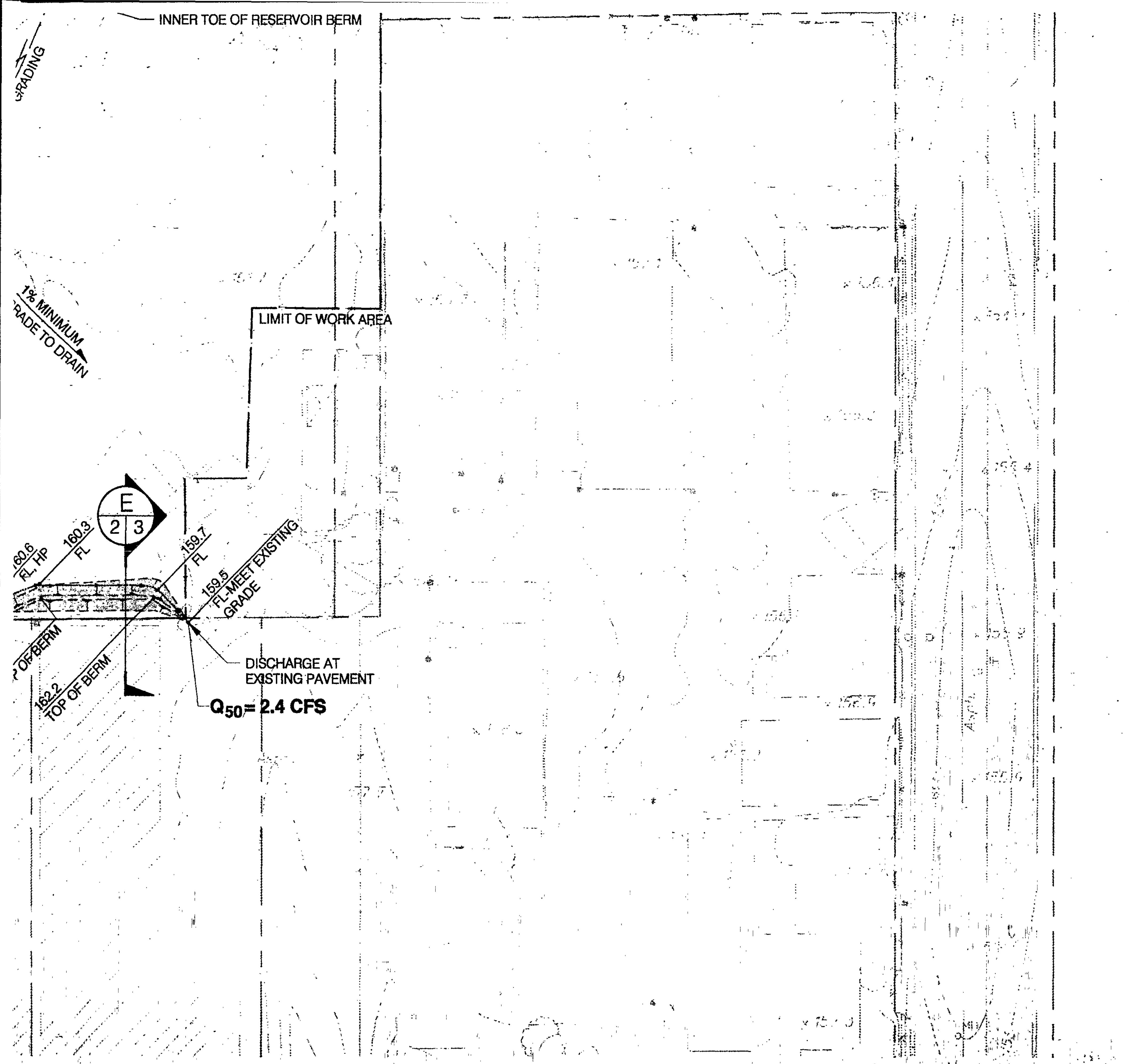
TITLE
TITLE, INDEX, LEGEND AND GENERAL NOTES

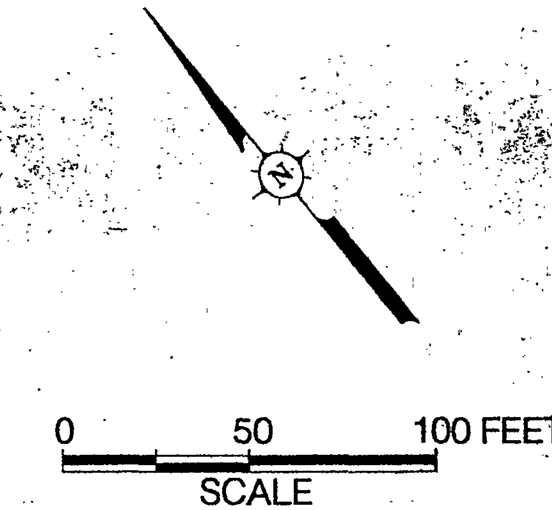
JOB NO.	SCALE	DRAWING NO.
94-256	AS NOTED	E-94256-RD001

TRC

REVISION A SHEET 1

1 of 4





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A	09/04/98	ISSUED FOR REVIEW	BMJ	RN

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WASTE DISPOSAL INC. SUPERFUND SITE
TECHNICAL MEMORANDUM NO. 11 - RESERVOIR AREA GRADING AND WASTE/DEBRIS MANAGEMENT

SANTA FE SPRINGS CALIFORNIA

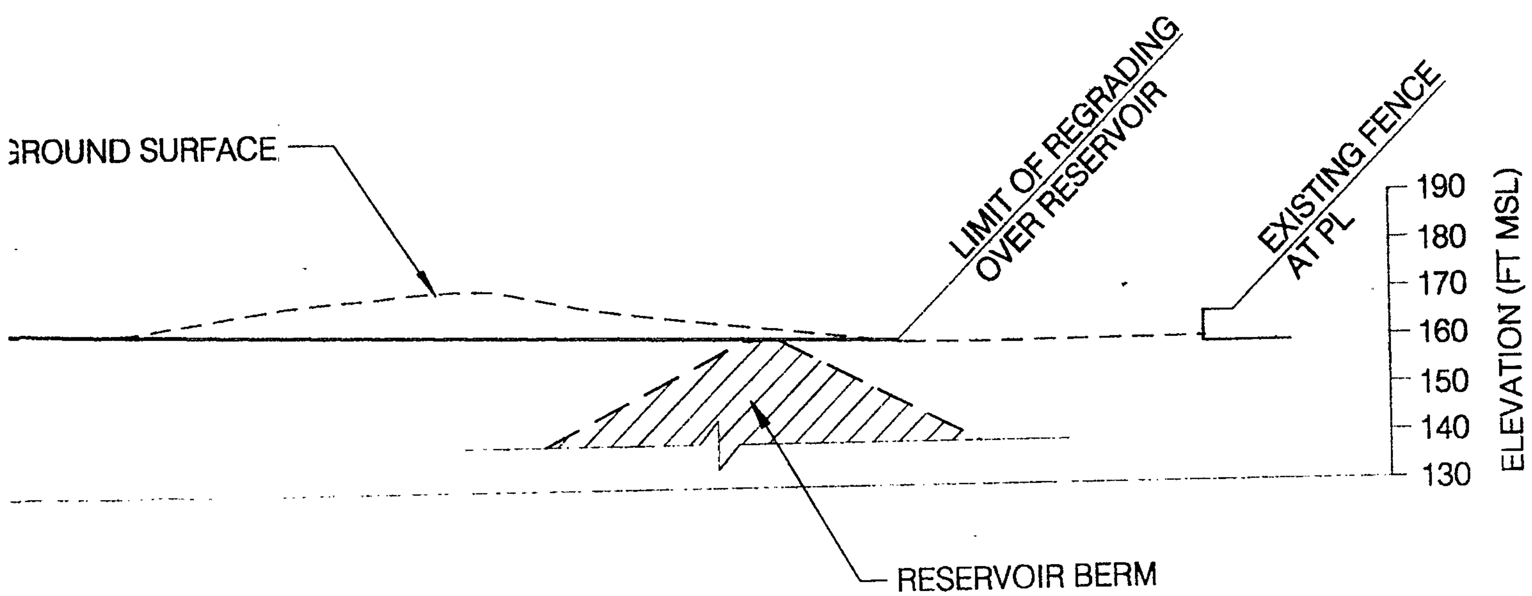
TITLE

SURFACE WATER MANAGEMENT
INTERIM GRADING PLAN

JOB NO.	SCALE	DRAWING NO.
94-256	AS NOTED	D-94256-RD002

TRC

REVISION A | SHEET 2



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WASTE DISPOSAL INC. SUPERFUND SITE
TECHNICAL MEMORANDUM NO. 11 - RESERVOIR AREA
GRADING AND WASTE/DEBRISE MANAGEMENT

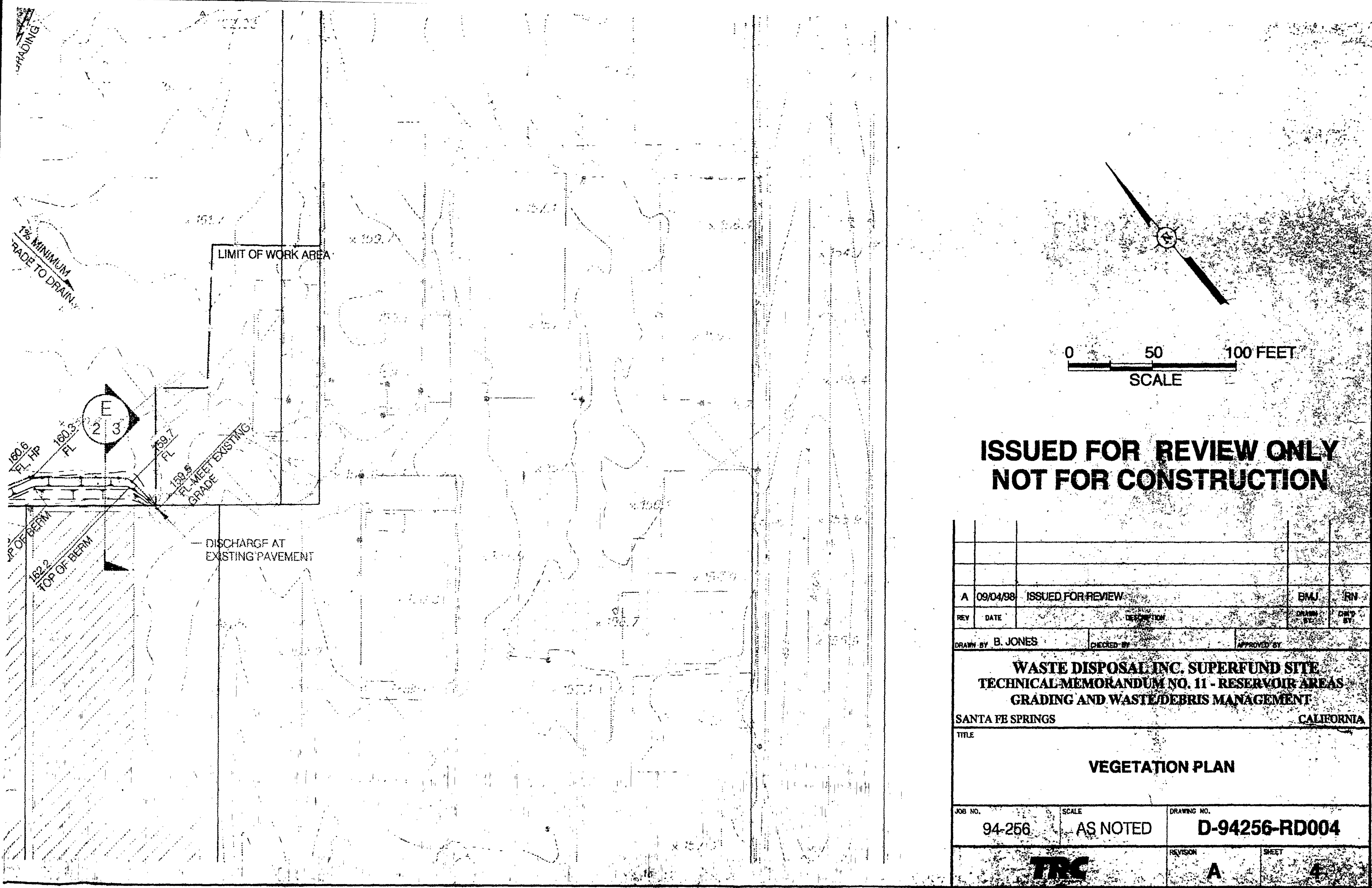
SANTA FE SPRINGS CALIFORNIA

TITLE

SECTIONS AND DETAILS

JOB NO.	SCALE	DRAWING NO.
94-256	AS NOTED	E-94256-RD003

TRC | REVISION A | SHEET 3



ISSUED FOR REVIEW ONLY
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REV	DATE	DESCRIPTION	DRAWN BY	CHK'D BY
A	09/04/98	ISSUED FOR REVIEW	BMJ	RN

DRAWN BY B. JONES | CHECKED BY | APPROVED BY

WASTE DISPOSAL INC. SUPERFUND SITE
TECHNICAL MEMORANDUM NO. 11 - RESERVOIR AREAS
GRADING AND WASTE/DEBRIS MANAGEMENT

SANTA FE SPRINGS CALIFORNIA

TITLE

VEGETATION PLAN

JOB NO.	SCALE	DRAWING NO.
94-256	AS NOTED	D-94256-RD004

TRC | REVISION A | SHEET 4

ATTACHMENT 2

SPECIFICATIONS

TRC

SECTION 01000
INTRODUCTION, SCOPE OF WORK AND GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 DESCRIPTION

A. The work (Work) described by these construction documents is to be performed on behalf of the Waste Disposal, Inc. Group, hereafter referred to as "OWNER." OWNER's design engineer, TRC, is hereafter referred to as "ENGINEER."

B. The Work shall be performed in accordance with the reference standards outlined in Section 01010.

1.02 SCOPE OF WORK

A. The scope of work described here is intended as a summary and does not relieve CONTRACTOR'S responsibility to inspect all construction documents in order to submit a complete bid. Work covered in these specifications encompasses the following activities:

1. Establish staging areas, site access, onsite roads and other facilities required for construction.
2. Demolish and remove pavement and other items (e.g., fences) on the site which will inhibit construction activities.
3. Provide stormwater runoff control, as necessary during construction.
4. Provide dust control during construction activities.
5. Rough grade site and subgrade preparation including removal of deleterious materials.
6. Compact fill (comprised of onsite soil) to provide a foundation for the drainage of the site area and designated areas noted on the Drawings.
7. Construct drainage control improvements, as shown on the Drawings.
8. Construct a pit in the central portion of the reservoir for deposition of soil cuttings excavated onsite which are currently stored in 55-gallon drums and rolloff bins.
9. Extend monitoring wells and probes to final elevation, as shown in grading plan.

10. Install landscaping (hydroseed).

11. Clean up site and remove all unused material, equipment, rubbish and debris.

12. Demobilization.

B. The Contractor, herein referred to as "CONTRACTOR," is responsible for providing construction services, temporary facilities and related materials and equipment for the Work described herein.

1.03 FORM OF SPECIFICATIONS

A. These specifications (Specifications) are written in the Construction Specifications Institute (CSI) three-part format (General, Materials, and Execution). For some sections all three parts are not necessary.

B. These Specifications are written in imperative and abbreviated form. This imperative language of technical sections is directed at CONTRACTOR unless specifically noted otherwise.

C. CONTRACTOR shall perform or provide items of the Work stated and comply with the requirements stated in each section, unless the items are specifically assigned to other contractors, ENGINEER, CONSTRUCTION QUALITY ASSURANCE (CQA) ENGINEER or OWNER.

D. The term "provide" or "provided" shall mean "furnished and installed by CONTRACTOR."

1.04 STANDARD SPECIFICATIONS

A. These Specifications are to be used in conjunction with the Standard Specifications For Public Works Construction, latest edition often referred to as the "Green Book" except Section 1 which is not applicable and Standard Specifications, State of California, Department of Transportation, July 1984, or later editions.

B. The Work is to be performed in accordance with the accepted Contractor's Health and Safety Plan.

1.05 INACCURACIES IN THE DRAWINGS OR SPECIFICATIONS

A. The written dimensions in the Drawings or in the Specifications are presumed to be correct, but CONTRACTOR shall be required to check carefully all dimensions before beginning the Work. If inaccuracies are discovered, ENGINEER shall be advised in writing immediately and will make the proper corrections. No extra work shall be performed on this contract without written authorization by OWNER or his designated representative.

1.06 MATERIAL SUBSTITUTIONS

A. Whenever a specific brand name or model number is used, an "approved equal" is implied. The specific name is used to clearly identify the item, its intended use, and its level of quality. All proposed substitutions require the approval of ENGINEER.

B. Unless specifically requested in the submittal section of these Specifications, submittal approvals are not required if materials are identical to those specified in this document.

C. Where equipment, materials, or articles are referred to in the Contract Documents as "or equivalent" and "equal to" a particular standard, ENGINEER shall determine equality.

1.07 PROJECT MEETINGS

A. Project meetings shall be held and conducted as described in Section 01020.

1.08 WORK SEQUENCE

A. CONTRACTOR shall not place vegetative soil cover or other materials before CQA ENGINEER and the regulatory agencies, if required, have approved grading areas.

1.09 QUALITY ASSURANCE

A. CQA ENGINEER shall monitor and document the Work completed by CONTRACTOR in accordance with Section 01200 and the CQA Plan. Performance criteria are set forth in these Specifications and the Drawings.

1.10 GENERAL CONDITIONS AND CONTRACTOR'S RESPONSIBILITIES

A. All Work shall be coordinated with PROJECT MANAGER, CQA ENGINEER, and necessary subcontractors. The purpose of this coordination is to foster good communications between all parties involved in the project and responsible for the operations of the site, and to identify potential problems that could impact the Work schedule.

B. The Specifications, Drawings and other documents shall govern the Work and shall be considered complimentary. Anything indicated in the Specifications and not in the Drawings or another document, or in the Drawings or another document and not in the Specifications, shall be considered to be contained in each.

C. CONTRACTOR shall, upon discovering any discrepancies in the Specifications, Drawings or other documents, immediately bring the discrepancies to the attention of ENGINEER.

D. CONTRACTOR shall furnish and maintain in good condition all material, equipment, and facilities necessary for the proper execution and inspection of the Work. The Work, equipment, and materials shall be protected from the weather, vandalism and other damage by CONTRACTOR until final acceptance of the entire project by CQA ENGINEER, PROJECT MANAGER, and OWNER. Such material, equipment, and facilities shall conform to all applicable ordinances and laws.

E. CONTRACTOR shall provide all required surveying services for performance of the Work. ENGINEER or designee will provide surveying services required for quality assurance activities.

F. The project site, including all staging and stockpile areas, shall be maintained by CONTRACTOR in a neat and orderly fashion, free of rubbish and debris.

G. Materials and equipment shall be removed from the site when no longer required for the Work. Prior to final inspection and acceptance of the Work, the site shall be cleared of equipment, unused materials and rubbish.

H. The cost of maintaining the site in a neat and orderly fashion and preparing the site for final inspection will be included as part of CONTRACTOR's bid.

I. CONTRACTOR shall provide, at his expense, temporary water, power, sanitation, telephone, and other utilities necessary for the Work, and shall remove such temporary utilities upon completion of the Work unless otherwise directed by OWNER.

J. Existing improvements/facilities that must be removed for the project, but are not designated for permanent removal, shall be repaired or replaced by CONTRACTOR, and shall be at least equal to the existing improvements/facilities and match them in finish and dimension.

K. CONTRACTOR shall prepare and have available onsite an approved Health and Safety Plan.

L. CONTRACTOR shall be responsible for the protection of public and private property adjacent to the Work and shall exercise due caution to avoid damage to such property.

M. CONTRACTOR shall provide signs, barricades, flagmen and other necessary safety personnel or items, such that the Work may be performed in a safe manner.

N. CONTRACTOR shall provide dust control as necessary to assure project compliance with provisions of the Health and Safety Plan, EPA, STATE, South Coast Air Quality Management District (SCAQMD), and other regulatory agency requirements.

O. CONTRACTOR shall clean public and private streets at the project site and any offsite borrow sources as necessary to maintain compliance with EPA, STATE, and other regulatory agency requirements.

P. As this is a Superfund remediation project, local permits for onsite activities are not usually required. However, should the local agencies, EPA and/or STATE require such permits, CONTRACTOR will be responsible for obtaining any and all permits required for the Work.

* * * END OF SECTION * * *

SECTION 01010
REFERENCE STANDARDS, DEFINITIONS AND ABBREVIATIONS

PART 1 GENERAL

1.01 DESCRIPTION

A. This section summarizes the reference standards, definitions and abbreviations used in the preparation of these Specifications and the Drawings.

B. Except as specifically stated otherwise in the Contract Documents, CONTRACTOR shall pay, at his own expense, all costs and fees for permits, licenses, certificates, etc., required by regulatory agencies, utilities, etc., for execution of work under this Contract.

C. Whenever any product is specified by references to Federal Specifications, American Society for Testing and Materials (ASTM) Standards, or other association standards, CONTRACTOR shall present an affidavit from the manufacturer certifying that the product complies with the particular standard specification. All references are to be latest edition of standards at time of bid closing. When necessary, requested or specified, supporting test data shall be submitted to substantiate compliance.

1.02 REFERENCE STANDARDS

A. The following industry standards, reports and other documents shall be considered minimum requirements under this specification, unless otherwise noted:

1. The rules and regulations of the Occupational Safety and Health Act (OSHA).
2. California Occupational Safety and Health Administration (Cal OSHA) Regulations, California Code of Regulations (CCR), Title 8, Part 5194.
3. Standards and specifications of the ASTM.
4. Standards and specifications of the American National Standards Institute (ANSI).
5. Uniform Building Code (UBC), 1994 edition.

6. Standards and specifications of the Plastic Piping Institute (PPI).

7. Standard Specifications for Public Works Construction, 1991 Edition.

8. Los Angeles County Department of Public Works Standard Plans and Specifications.

9. Title 40, Code of Federal Regulations (CFR), Part 264, Subpart N: RCRA Requirements for Design and Construction of Hazardous Waste Landfills.

10. Title 22, California Code of Regulations (CCR), Chapter 14, Article 14.

11. Title 23, CCR, Chapter 15: California Standards for Design and Construction of Hazardous Waste Management Units to Protect Waters of the State.

12. Earth Manual (Bureau of Reclamation E-13 Standard).

1.03 DEFINITIONS

A. Whenever the following terms are used in these Specifications, the intent and meaning shall be interpreted as follows:

1. OWNER: Waste Disposal, Inc. Group.

2. PROJECT MANAGER: The designated coordination representative of the OWNER.

3. ENGINEER: The designated technical representative of the OWNER, TRC prepared the Specifications presented herein in conjunction with the Drawings.

4. CONSTRUCTION QUALITY ASSURANCE (CQA) ENGINEER: A firm retained by OWNER to provide CQA services required in these Specifications and the Quality Assurance Plan.

5. CONTRACTOR(S): Individual(s), firm(s), or corporation(s) who have entered into an agreement with OWNER. For these Specifications, the term CONTRACTOR is interchangeable with Subcontractor.

6. MANUFACTURER(S): Individual(s), firm(s), or corporation(s) who fabricate or produce materials, equipment, other products and supply them to CONTRACTOR for construction.

7. CONTRACT DOCUMENTS: Includes these Specifications, Drawings, and attachments incorporated by reference.

8. PROJECT SITE: The space available to CONTRACTOR for performance of construction activities, either exclusively or in conjunction with others

performing other work as part of the Project. The extent of the PROJECT SITE is shown in the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

9. REGULATION: The term "REGULATION" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

10. CALENDAR DAY: Any day of the year.

11. WORKING DAY: A calendar day, excluding Saturday, Sundays, and OWNER's recognized legal holidays, on which weather and other conditions not under the control of CONTRACTOR permit construction operations to proceed for the major part of the day, with the normal working force engaged in performing the controlling item or items of Work which would be in progress at that time.

12. REGULAR WORKING HOURS: Work will be confined to a period between 7:00 a.m. and 6:00 p.m. on allowable work days. No work shall be performed outside of this time period without the express authorization by OWNER or designated representative.

1.04 ABBREVIATIONS

A. The following abbreviations may be in the Contract Documents and represent the organization or topic named. The names are believed to be correct as of the date of the Contract Documents.

ACI	-	American Concrete Institute
AISC	-	American Institute of Steel Construction
AISI	-	American Iron and Steel Institute
ANSI	-	American National Standards Institute
ASCE	-	American Society of Civil Engineers
ASME	-	American Society of Mechanical Engineers
ASTM	-	American Society for Testing and Materials
Cal-OSHA	-	California Occupational Safety and Health Administration
CCR	-	California Code of Regulations
CFR	-	Code of Federal Regulations
CMP	-	Corrugated Metal Pipe
CQA	-	Construction Quality Assurance
CRSI	-	Concrete Reinforcing Steel Institute
CS	-	Carbon Steel
DOT	-	Department of Transportation
Elev.	-	Elevation
EPA	-	United States Environmental Protection Agency
FG	-	Finished Grade
FL	-	Flow Line
FML	-	Flexible Membrane Liner

FS	-	Finished Surface
HDPE	-	High Density Polyethylene
HSO	-	Health and Safety Officer
Inv. -		Invert
LADPN	-	Los Angeles Department of Public Works
MCL	-	Maximum Contaminant Level
NEC	-	National Electric Code
NEMA	-	National Electrical Manufacturers Association
NFPA	-	National Fire Protection Association
NSF	-	National Sanitation Foundation
NWWA	-	National Water Well Association
OSHA	-	Occupational Safety and Health Administration
PCA	-	Portland Cement Association
PPI	-	Plastic Piping Institute
PVC	-	Polyvinyl Chloride
QA/QC	-	Quality Assurance/Quality Control
QAPP	-	Quality Assurance Project Plan
RWQCB	-	Regional Water Quality Control Board
SCAQMD	-	South Coast Air Quality Management District
SD	-	Storm Drain
SDR	-	Standard Dimension Ratio
SPI	-	Society of the Plastics Industry
SS	-	Stainless Steel
UL	-	Underwriter's Laboratories, Inc.

* * * END OF SECTION * * *

SECTION 01020
PROJECT COORDINATION AND MEETINGS

PART 1 GENERAL

1.01 DESCRIPTION

A. This section includes a description of the following:

1. Project coordination by the PROJECT MANAGER.
2. Schedules.
3. Project Meetings.

1.02 RELATED SECTIONS

A. The following specifications sections should be referred to:

1. Section 01000 - Introduction, Scope of Work and General Requirements.
2. Section 01200 - Quality Assurance/Quality Control.

1.03 PROJECT COORDINATION

A. The overall PROJECT MANAGER will be determined prior to beginning of grading activities.

B. The CONTRACTOR will cooperate with the PROJECT MANAGER in allocation of mobilization areas of site; for field offices and sheds, for access, traffic, and parking facilities.

C. During construction, the CONTRACTOR will coordinate use of the site and facilities through the PROJECT MANAGER.

D. The CONTRACTOR will comply with PROJECT MANAGER's procedures for intra-project communications; submittals, reports and records, schedules, drawings, and recommendations; and resolution of ambiguities and conflicts.

E. The CONTRACTOR will comply with instructions of the PROJECT MANAGER for use of temporary utilities and construction facilities.

F. The CONTRACTOR will coordinate field engineering and layout work under instructions of the PROJECT MANAGER.

1.04 SCHEDULES

A. The CONTRACTOR shall submit a preliminary Construction Progress Schedule in accordance with Section 01400.

1.05 PROJECT MEETINGS

A. Representatives of CONTRACTOR, subcontractors, and suppliers attending meetings shall be authorized to act on behalf of the entity each represents.

B. Preconstruction Conference:

1. The conference will be held at a location and time selected by OWNER.
2. The conference will be held immediately after award of contract to assure expeditious execution of the Work.
3. The conference shall be attended by:
   - PROJECT MANAGER.
   - CONTRACTOR's office representative.
   - CONTRACTOR's resident superintendent.
   - Any subcontractors' or suppliers' representatives whom CONTRACTOR may desire to invite or ENGINEER may request be present.
   - CQA ENGINEER's representative.
   - ENGINEER's representatives.
   - OWNER's representatives.
   - EPA's representatives, and other parties as required by EPA.
4. A suggested format would include, but not be limited to, the following subjects:
   - Presentation of a proposed Construction Progress Schedule in accordance with Section 01400.
   - Check of required insurance certifications prior to Notice to Proceed.
   - CONTRACTOR's proposal for locating soil and drain rock materials and for preconstruction testing of these materials.
   - CONTRACTOR's proposals for staging area, equipment and personnel decontamination, and Health and Safety Plan with associated monitoring.
   - Direction of correspondence, and coordinating responsibility between OWNER, CONTRACTOR, ENGINEER, CQA ENGINEER, and EPA.
   - Future weekly job meetings for parties involved.

- Laboratory testing of material requirements.
- Review of submittals and due dates.
- Review, discussions and approval, if appropriate, of substitutions.
- Discussion of health and safety requirements.
- Review of security, access and parking procedures.
- Discussion of critical path items and required actions.
- Schedule of values, application for payment, and progress payment procedures.
- OWNER's site regulations.

C. Progress Meetings

1. PROJECT MANAGER shall schedule and administer progress meetings a minimum of once per week and such additional meetings as may be required.

2. Attendance:
   - PROJECT MANAGER.
   - OWNER's representative, as necessary.
   - CONTRACTOR's superintendent.
   - CQA ENGINEER.
   - EPA representatives, as necessary.
   - ENGINEER, as appropriate to the agenda.
   - Subcontractors, as appropriate to the agenda.
   - Suppliers, as appropriate to the agenda.

3. Meeting Requirements:
   - PROJECT MANAGER shall administer the following general requirements for progress meetings:
     - Prepare an agenda for the meetings.
     - Make physical arrangements for the meetings.
     - Preside at the meetings.
     - PROJECT MANAGER shall take the meeting minutes.
     - PROJECT MANAGER shall reproduce and distribute copies of the meeting record as part of the weekly report required in Section 01400 within one day after each meeting to participants in the meeting and to parties affected by decisions made at the meeting.

4. Suggested Agenda:
   - Review and approval of record of the previous meeting.
   - Review of the Work progress since the previous meeting.
   - Field observations, problems, and conflicts.
   - Problems which could potentially impede the Work schedule.
   - Review of offsite delivery schedules.
   - Corrective measures and procedures to regain the projected schedule, if necessary.
   - Revisions to the construction progress schedule.
   - Planned progress during the upcoming Work period.

- Review of health and safety issues, including monitoring.
- Coordination of the schedules.
- Review of submittal schedules; expedition as required.
- Maintenance of quality and safety standards.
- Pending changes and substitutions.
- Review proposed changes for effect on construction schedule and completion date, and on other contracts of projects.
- Other business.

* * * END OF SECTION * * *

SECTION 01100
SURVEYING

PART 1 GENERAL

1.01 DESCRIPTION

A. This section includes a description of the following:

1. Survey.
2. Quality control of survey.
3. Submittals.
4. Project record documents related to surveying.

1.02 RELATED SECTIONS

A. Section 01300 - Measurement and Payment: Measurement for Work requiring unit price payment.

B. Section 01010 - Referenced Standards and Definitions.

C. Section 01200 - QA/QC.

D. Section 01700 - Project Closeout: Project Record Documents.

1.03 QUALITY ASSURANCE

A. CONTRACTOR shall employ a Land Surveyor (SURVEYOR) registered in the State of California and acceptable to ENGINEER, to perform survey work of this section.

1.04 SUBMITTALS FOR REVIEW

A. CONTRACTOR shall submit name, address, and telephone number of SURVEYOR before starting survey work or shop drawings.

B. On request, CONTRACTOR shall submit documentation verifying accuracy of survey work.

C. CONTRACTOR shall submit a copy of site drawing and certificate signed by the Land Surveyor, that the elevations and locations of the Work are in conformance with Contract Documents.

D. CONTRACTOR shall submit evidence of SURVEYOR's Errors and Omissions insurance coverage in the form of an Insurance Certificate.

1.05 PROJECT RECORD DOCUMENTS.

A. CONTRACTOR shall maintain a complete and accurate log of control and survey work as it progresses.

B. CONTRACTOR shall submit Record Documents under provisions of Section 01700.

1.06 EXAMINATION

A. CONTRACTOR and ENGINEER shall verify locations of survey control points prior to starting work.

B. CONTRACTOR shall promptly notify ENGINEER of any discrepancies discovered.

1.07 SURVEY REFERENCE POINTS

A. CONTRACTOR shall locate and protect survey control and reference points.

B. CONTRACTOR and SURVEYOR shall protect survey control points prior to starting site work; preserve permanent reference points during construction.

C. CONTRACTOR shall promptly report to PROJECT MANAGER the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

D. CONTRACTOR shall replace dislocated survey control points based on original survey control and make no changes without prior written notice to ENGINEER.

1.08 SURVEY REQUIREMENTS

A. CONTRACTOR's SURVEYOR shall establish permanent bench marks on site, referenced to established control points. SURVEYOR shall record locations, with horizontal and vertical data, on project record documents.

B. SURVEYOR shall establish elevations, lines and levels as shown in the Drawing.

1.09 SURVEYS FOR MEASUREMENT AND PAYMENT

A. SURVEYOR shall perform surveys to determine quantities of unit cost work, including control surveys to establish measurement reference lines. SURVEYOR shall notify PROJECT MANAGER prior to starting work.

* * * END OF SECTION * * *

SECTION 01200
QUALITY ASSURANCE/QUALITY CONTROL

PART 1 GENERAL

1.01 DESCRIPTION

A. This section includes an overview of quality control of construction and installation, tolerances, references, inspecting and testing laboratory services, and MANUFACTURER's field services and reports.

B. Refer to the CQA Plan, which must be approved by the ENGINEER for procedures and documentation requirements for CQA. The CQA Plan shall include, as a minimum, the following:

1. A statement of the purpose and objectives of CQA.
2. Description of the roles, responsibilities and authority of each party (i.e., CONTRACTOR, ENGINEER, CQA ENGINEER, PROJECT MANAGER, and OWNER).
3. An outline of the process for implementation (e.g., flow diagram).
4. Reference to the relevant standards, codes and methods to be used for quality control testing.
5. A description of the observations, testing, notification, corrective action and documentation requirements.
6. A procedure for formal design change requests and approvals.
7. Discussion of the necessary coordination between CONTRACTOR, ENGINEER, CQA ENGINEER, PROJECT MANAGER, OWNER and reviewing agencies.

1.02 QUALITY CONTROL OF CONSTRUCTION AND INSTALLATION

A. Construction quality control includes:

1. Monitoring by CQA ENGINEER of suppliers, manufacturers, materials, services, site conditions and workmanship, to produce work of specified quality.
2. CONTRACTOR compliance with MANUFACTURER's instructions, including each step in sequence.

3. Should MANUFACTURER's instructions conflict with Contract Documents (Specifications and Drawings), the CONTRACTOR shall request clarification from the ENGINEER before proceeding.

4. CONTRACTOR compliance with specified standards as a minimum quality for the Work except where more stringent tolerances, codes or specified requirements indicate higher standards or more precise workmanship.

5. Work performed by persons qualified to produce workmanship of specified quality.

B. Testing standards and frequencies for specific work elements (e.g., structural fill, geosynthetics) are provided in individual Division 2 - Site Work Specification sections.

C. Quality Assurance Procedures are provided in the CQA Plan.

1.03 TOLERANCES

A. Tolerances shall be controlled during construction and installation of materials to produce acceptable work. Specific work element tolerances are provided in relevant Division 2 - Site Work Specification sections. Tolerances shall not be permitted to accumulate.

B. CONTRACTOR shall comply with MANUFACTURER's tolerances. Should MANUFACTURER's tolerances conflict with Contract Documents, the CONTRACTOR shall request clarification from ENGINEER before proceeding.

C. Materials shall be adjusted to appropriate dimensions and positioned before securing in-place.

1.04 REFERENCES

A. Refer to Section 01010 and individual Specification sections for specific reference standards.

B. CONTRACTOR shall conform to reference standard by date of current issue except where a specified date is given in a code.

C. CONTRACTOR shall obtain copies of standards where required by material Specification sections.

D. Retesting required because of nonconformance to specified requirements shall be performed on instructions by ENGINEER. Payment for retesting will be charged to CONTRACTOR by deducting inspecting or testing charges from the contract sum/price.

1.05 CONSTRUCTION ACCEPTANCE

A. CONTRACTOR will retain ownership and responsibility for the materials used in construction until acceptance by OWNER. At OWNER'S discretion, the Work may be accepted in sections or at points of substantial completion. CQA ENGINEER is responsible for determining and documenting the Work complies with the Construction Documents.

B. The construction will not be accepted by ENGINEER and OWNER before:

1. The installation of a construction element, or section thereof, is finished.
2. Verification of the adequacy of testing, is completed.
3. Documentation of construction and test results are completed and reviewed.

C. CQA ENGINEER shall certify that construction has proceeded in accordance with the Construction Documents except as noted to ENGINEER and OWNER.

* * * END OF SECTION * * *

SECTION 01300
MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 DESCRIPTION

A. CONTRACTOR, in compliance with the invitation to bid for this project, acknowledges examining the Contract Documents. In addition, the CONTRACTOR acknowledges having inspected the site of the proposed Work, and being familiar with the conditions surrounding the project, including the availability of equipment, materials, and labor. Hereby, CONTRACTOR will furnish all labor, materials, equipment and supplies to complete the project in accordance with the Contract Documents within the duration set forth in Section 01400, at the prices stated in the Bid Schedule. These unit prices are to cover all expenses incurred in performing the Work required under the Contract Documents.

B. Unit prices shall be presented in both words and figures. In case of discrepancy, the unit price shown in words shall govern.

C. The unit price shall include all labor, products, materials (as specified), temporary facilities, taxes, equipment, hauling, excavating, onsite cuttings reconsolidation, offsite rubbish and debris disposal, installation of the Work, overhead, profit, insurance, bonds, etc., necessary to complete the finished Work specified.

1.02 AUTHORITY

A. Measurement methods delineated in the Bid Schedule are intended to complement the criteria of this section. In the event of a conflict, the requirements of the individual Specification section shall govern.

B. CONTRACTOR shall measure and compute the quantities of all Bid work items. OWNER's REPRESENTATIVE will verify measurements and quantities.

1.03 MEASUREMENT OF QUANTITIES

A. OWNER's REPRESENTATIVE will compute final in-place quantities based upon survey data and observation for each item listed in the Bid Schedule. The following methods will be used for the computations.

1. Measurement for payment of lump sum Work items listed in the Bid Schedule shall be based upon an estimated percent complete of the work item.

2. Measurement for payment of Work items listed in the Bid Schedule to be paid at a unit price per lineal foot shall be based on the length shown in the Drawings unless the length has been modified and approved by the ENGINEER and OWNER's REPRESENTATIVE. Modified lengths shall be determined by survey made jointly by both CONTRACTOR and OWNER's REPRESENTATIVE. Any discrepancies in measured lengths shall be resolved prior to submittal of quantities for payment.

3. Measurement for payment of Work items listed in the Bid Schedule to be paid at a unit price per square foot shall be based on the area in square feet as calculated from dimensions shown in the Drawings, except geosynthetics, unless the dimensions have been modified and approved by ENGINEER and OWNER's REPRESENTATIVE. Modified dimensions shall be determined by survey made jointly by both CONTRACTOR and OWNER's REPRESENTATIVE. Geosynthetics (geomembrane, geocomposite, filter fabric) quantities actually placed shall be determined by survey. The square footage shall be calculated independently by both CONTRACTOR and OWNER's REPRESENTATIVE and any discrepancies resolved prior to submittal of quantities for payment.

4. Measurement for payment of Work items listed in the Bid Schedule to be paid at a unit price per cubic foot or cubic yard shall be based on the volume in cubic feet or cubic yards as calculated from dimensions shown in the Drawings, unless the dimensions have been modified and approved by ENGINEER and OWNER's REPRESENTATIVE. Modified dimensions shall be determined by survey. The volume shall be calculated independently by both CONTRACTOR and OWNER's REPRESENTATIVE and any discrepancies resolved prior to submittal of quantities for payment.

1.04 PAYMENT

A. Payment for the Work governed by unit prices will be made on the basis of the actual measurements and quantities accepted by the OWNER'S REPRESENTATIVE multiplied by the unit prices shown on the Bid Schedule for the Work, less any liquidated damages or subcontractor costs related to repair of damaged systems.

1.05 DEFECT ASSESSMENT

A. CONTRACTOR will replace the Work or portions of the Work not conforming to specified requirements at no additional cost.

B. If, in the opinion of the ENGINEER or OWNER, it is not practical to remove and replace the Work:

- The defective Work will be repaired in accordance with the instructions of ENGINEER, and the lump sum/unit price will be adjusted to a new lump sum/unit price at the discretion OWNER.

1.06 NONPAYMENT FOR REJECTED PRODUCTS

A. Payment will not be made for any of the following reasons:

- Products wasted or used in a manner that is not acceptable.
- Products determined to be unacceptable before or after placement.
- Products not completely unloaded from the transporting vehicle.
- Products placed beyond the lines and levels of the required Work.
- Products remaining on hand after completion of the Work.
- Loading, hauling and disposing of rejected or surplus products.

PART 2 EXECUTION

2.01 METHOD OF MEASUREMENT AND PAYMENT

A. All Work to be paid for at a contract unit price will be verified by the PROJECT MANAGER in accordance with United States Standard measures in the specified units. For each bid item described in the Bid Schedule, it is understood that the CONTRACTOR shall include with that item all labor, equipment, material, painting, cleanup, safety measures, or anything else that may be required to successfully complete the Work. It is also understood that all work is to be completed in compliance with the Contract Documents.

B. Full compensation for all expenses shall be considered to be included in the unit prices paid for the bid items being measured. No additional compensation will be allowed.

C. The method of measurement and payment, as described herein is for each item that appears in the Bid Schedule.

*** END OF SECTION ***

SECTION 01410
SUBMITTALS

PART 1 GENERAL

1.01 DESCRIPTION

A. This section specifies procedural requirements for Work-Related submittals including Shop Drawings, substitutions, product/material data, samples, and other miscellaneous Work-Related submittals.

B. Types of Work-Related Submittals:

1. Substitutes or "Or Equal" Items:

   a. Includes material or equipment the CONTRACTOR requests the ENGINEER to accept as a substitute for items specified or described by using proprietary name or name of a particular Supplier.

2. Product/Material Data:

   a. Includes standard printed information on manufactured products, and systems that have not been specially prepared for this project, including manufacturer's product specifications and installation instructions, catalog cuts, standard wiring diagrams, printed performance curves, mill reports, and standard color charts.

3. Samples:

   a. Includes natural materials (soil and drain rock), examples of fabricated and manufactured materials, products, and units of work, includes complete units, partial cuts of manufactured or fabricated work, and units of work to be used for independent inspection and testing.

4. Miscellaneous Submittals:

   a. Work-related submittals that do not fit in the four previous categories, including guarantees, warranties, certifications, experience records, maintenance agreements, workmanship bonds, survey data and reports, physical work records, quality testing and certifying reports, copies of industry standards, record drawings, field measurement data, and materials applicable to the Work.

C. The CONTRACTOR'S responsibilities shall include the following.

1. Determine and verify:

   a. Field measurements.

   b. Field construction criteria.

   c. Catalog numbers and similar data.

   d. Conformance with Specifications.

2. Coordinate each submittal with requirements of the Work and Contract Documents.

3. Notify the PROJECT MANAGER in writing, at the time of the submittal, of deviations from requirements of Contract Documents.

4. Designate in the Construction Progress Schedule (see Section 01400), dates for submittal and receipt of review.

1.02 SUBMITTAL PROCEDURES

A. Scheduling:

1. The CONTRACTOR shall include a submittal schedule in the Construction Progress Schedule.

2. Each submittal shall be prepared and transmitted to the PROJECT MANAGER sufficiently in advance of the scheduled performance of the related work and other applicable activities.

B. Coordination:

1. Preparation and processing of submittals shall be coordinated with the performance of the Work. Coordinate each separate submittal with other submittals and related activities such as substitution requests, testing, purchasing, fabrication, delivery, and similar activities that require sequential activity.

2. Submittal of different units of interrelated work shall be coordinated so that one submittal will not be delayed by the ENGINEER'S need to review a related submittal. ENGINEER reserves the right to withhold action on any submittal requiring coordination with other submittals until the related submittals are forthcoming.

C. Submittal Preparation:

1. Stamp and sign each submittal certifying review of submittal, verification of products, field measurement, field construction criteria, and coordination of information within submittal with requirements of the Work and the Contract Documents.

2. Transmittal form must contain the following:

   a. Date of submittal and dates of previous submittals.

   b. Project title and number.

   c. Contract identification.

   d. Names of:

      - CONTRACTOR
      - Supplier
      - Manufacturer

   e. Summary of items contained in the submittal.

   f. Identification of the product with identification numbers, and the Drawing and Specification section numbers.

   g. Clearly identified field dimensions.

   h. Details required on the Drawings and in the Specifications.

   i. Manufacturer, model number, dimensions, and clearances, where applicable.

   j. Relation to adjacent or critical features of the Work or materials.

   k. Applicable standards, such as ASTM numbers.

   l. Identification of deviations from Contract Documents.

   m. Identification of revisions on resubmittals.

   n. Blank space for ENGINEER's stamp.

3. Refer to individual Specification sections for specific requirements. A submittal is the final submittal unless returned by ENGINEER or PROJECT MANAGER, marked with "Action" indicating observed noncompliance.

4. In addition to copies desired for CONTRACTOR'S use, furnish three executed copies.

B. Other Submittals:

1. Plans and Schedules:

   a. Health and Safety Plan (see Section 01600) shall be prepared and submitted at least 7 days prior to commencing site work.

   b. Stormwater Runoff Control Plan (see Section 02030) shall be prepared and submitted at least 7 days prior to commencing site work.

   c. Construction Progress Schedule (see Section 01400) shall be prepared and submitted with CONTRACTOR's bid.

d. Material List shall be submitted no later than 7 days prior to the system installation.

2. Guarantees and Warranties:

   a. Refer to individual Specification sections for specific requirements. A submittal is the final submittal unless returned by ENGINEER or PROJECT MANAGER, marked with "Action" indicating observed noncompliance.

   b. In addition to copies desired for CONTRACTOR'S use, furnish three executed copies.

3. Survey Data:

   a. CONTRACTOR shall submit an As-Built Survey of the construction facilities, grades, etc. prepared by an independent survey company approved by PROJECT MANAGER.

4. Standards:

   a. Where a copy of a submittal is indicated, and except where copies of standards are specified as an integral part of a "Product Data" submittal, submit a single copy to ENGINEER. Where workmanship at the Project Site or elsewhere is governed by the standard, furnish additional copies to fabricators, installers, and others involved in the work performance.

5. Certifications and Conformance and Destructive Test Results:

   a. Refer to individual specification sections for specific requirement on submittal of certifications and conformance test results. Certifications are submitted for review of conformance with specified requirements and information. Submittal is final unless returned by the CQA ENGINEER or PROJECT MANAGER, marked for "Action."

* * * END OF SECTION * * *

SECTION 01500
CONSTRUCTION SITE MAINTENANCE,
TEMPORARY CONSTRUCTION FACILITIES AND UTILITIES

PART 1 GENERAL

1.01 DESCRIPTION

A. CONTRACTOR shall maintain the construction site surface, access, fencing and other security controls, material stockpiles, partially completed work, equipment and any other items onsite in a neat, orderly and safe condition at all times. Particular attention and care shall be given to dust control, as described in Section 02050.

B. CONTRACTOR shall furnish, install, and maintain temporary facilities and utilities required for construction, and remove such items upon completion of the Work.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

A. CONTRACTOR shall comply with the relevant portions of National Fire Protection Association (NFPA) regulations and National Electric Code.

B. CONTRACTOR shall comply with federal, state, and local codes and regulations, as well as utility company requirements.

1.03 CONSTRUCTION SITE MAINTENANCE

A. It is the intent of these Specifications that throughout construction, the CONTRACTOR shall keep all areas clear of debris, refuse or construction materials that render the construction area visually and/or odor offensive.

B. Throughout the period of construction CONTRACTOR shall keep the work site clean of rubbish and debris, and shall promptly remove from any portion of the site unused materials, surplus materials and debris.

C. Upon completion of the work, and prior to final acceptance (within the allowable construction time), CONTRACTOR shall remove from the vicinity of the Work all surplus material and equipment belonging to CONTRACTOR or used under his direction (e.g., by subcontractors) during construction, shall clean the site, and remove rubbish and debris.

PART 2 MATERIALS

2.01 TEMPORARY ELECTRICITY AND LIGHTING

A. General:

1. The CONTRACTOR shall be responsible for providing extensions to existing electric power drops for necessary temporary electrical power, including temporary wiring, distribution, inspection and safety and removal of such temporary facility upon completion of the Work. CONTRACTOR will pay for electrical power necessary for performance of the Work.

2. Temporary lighting shall be supplied by CONTRACTOR and must be sufficient to enable CONTRACTOR to complete the Work, and for OWNER and CQA ENGINEER to check the Work as it is being performed.

2.02 TELEPHONE SERVICE

A. CONTRACTOR shall be required to supply its own telephone services.

2.03 SAFETY EQUIPMENT

A. CONTRACTOR shall provide and install first aid kits and other safety equipment for its employees' use in readily accessible locations and in accordance with the requirements of the Occupational Safety and Health Administration (OSHA) and Project Health and Safety Plan.

B. CONTRACTOR shall provide fire extinguishers of the type and capacity required by pertinent safety and other regulations to protect the site and ancillary facilities in the vicinity of the Work. Fire extinguishers shall be placed in readily accessible locations.

2.04 WATER FOR CONSTRUCTION

A. Water for construction will be provided by CONTRACTOR at existing public sources (e.g. fire hydrants).

B. CONTRACTOR will be responsible to haul water from these locations for use to accomplish the Work.

C. Potable water shall be supplied by CONTRACTOR.

D. Water should be used conservatively and only for purposes identified herein.

E. CONTRACTOR is responsible for sampling and testing prior to disposal and for disposing all wastewater generated during execution of the Work which has come in contact with contaminated soils.

2.05 WARNING DEVICES AND BARRICADES

A. For the duration of construction, CONTRACTOR shall provide and maintain warning signs and devices and, where necessary, physical barriers and barricades and other temporary construction controls necessary for protection of persons and property in accordance with pertinent safety and other regulations.

2.06 TEMPORARY SANITARY FACILITIES

A. CONTRACTOR shall provide temporary sanitary toilet facilities conforming to state and local health and sanitation regulations, in sufficient number for use by CONTRACTOR's employees, OWNER, ENGINEER, subcontractor and other site visitors.

B. CONTRACTOR shall maintain the facilities in sanitary condition and supplied with toilet paper.

C. CONTRACTOR shall remove the facilities from the site upon completion of the Work.

2.07 DAMAGE TO EXISTING PROPERTY

A. CONTRACTOR shall be responsible for replacing or repairing damage to existing buildings, sidewalks, roads, parking lot surfacing, site facilities and buildings, stored lumber and other existing assets.

B. All structures, utilities, sidewalks, pavements, and other facilities shall be protected from damage caused by settlement, lateral movement, washout, and other hazardous created by operations under this Work.

2.08 SECURITY

A. CONTRACTOR shall be held responsible for loss or injury to persons or property where Work performed by CONTRACTOR is concerned. CONTRACTOR shall provide such security and take such precautionary measures, as deemed necessary, to protect CONTRACTOR's and OWNER's interests.

2.09 TEMPORARY PARKING

A. Designated areas onsite may be used for parking of construction personnel's private vehicles and the CONTRACTOR's light-weight vehicles.

   1. Heavy vehicles or construction equipment shall not be allowed in the parking areas.

B. The CONTRACTOR(s) shall make arrangements with the OWNER's REPRESENTATIVE for use of onsite parking areas.

2.10 FIELD OFFICES AND BUILDINGS

A. As directed by OWNER, CONTRACTOR shall erect an approved area of the site and maintain in good condition temporary field offices and tool storage building(s) for use by CONTRACTOR, OWNER, ENGINEER, CQA ENGINEER and subcontractors. Building and facilities to be provided include:

   1. Two office/conference rooms (one for CONTRACTOR, one for ENGINEER), at least 20 feet by 12 feet.

2. Water for washing and decontamination of sampling and other equipment.

3. Indoor and outdoor space lighting.

B. Tool storage building(s) shall be of ample size to provide space for tools and equipment. Building(s) shall be neat and well constructed, surfaced with plywood, drop siding, masonite or equivalent material, well painted and void of advertisements.

PART 3 EXECUTION

3.01 GENERAL

A. Temporary construction facilities and utilities shall be maintained and operated to ensure continuous service.

B. Facilities and utilities may be modified and extended as the Work progress requires.

3.02 DUST CONTROL

A. During grading, all working areas, excavated material and unpaved roadways shall be watered down until the surface is moist, and then maintained in a moist condition to minimize dust. Specification Section 02050 provides more detail for dust control requirements.

3.03 STORMWATER RUNOFF CONTROL

A. Stormwater runoff control shall be furnished by CONTRACTOR during execution of the Work as described in Section 02030. The objective of the stormwater control is to prevent sediment runoff from disturbed areas, prevent runoff from the soil excavation areas, and to prevent contact between rainwater and contaminated soils.

3.04 TEMPORARY SITE ACCESS

A. Designated temporary site access will be prepared by CONTRACTOR during construction activities. Specification Section 02070 provides details.

3.05 PROTECTION OF THE PUBLIC AND PROPERTY

A. The CONTRACTOR shall adopt every practical means and comply with all laws and regulations in order to minimize interferences to traffic, and inconveniences and discomfort to the public, including provisions for adequate dust control measures.

B. The CONTRACTOR shall not trespass upon private property and shall be responsible for all injury or damage to persons or property directly or indirectly resulting from its operations in completing the Work. The CONTRACTOR shall comply with the laws and regulations of the OWNER, County, and State relating to the safety of persons and property, and will be held responsible for, and required to make good on, any injury or damage to persons or property caused by carelessness or neglect on the part of the CONTRACTOR or its subcontractor(s), or agent or employee of either during the progress of the Work and until its final acceptance.

C. The CONTRACTOR shall protect pipes, sewer conduits, electrical conduits, lawns, gardens, shrubbery, trees, fences, overhead lines, or other structures, utilities or property, public and/or private, encountered in this Work against injury except as stipulated elsewhere herein. The CONTRACTOR shall be responsible and liable for any injury to such pipe, structures, utilities, vegetation and property and shall restore them to a condition equal to or better than the original at the CONTRACTOR's expense.

3.06 REMOVAL

A. Temporary facilities and utilities no longer in use shall be removed.

B. CONTRACTOR shall clean and repair damage caused by temporary installations or use of temporary facilities.

C. CONTRACTOR shall restore existing or permanent facilities used for temporary services to specified or original condition.

* * * END OF SECTION * * *

SECTION 01600
HEALTH AND SAFETY

PART 1 GENERAL

A. It will be the responsibility of CONTRACTOR to develop a site-specific Health and Safety Plan for the Work. The plan must conform to 29 CFR 1910.120. The Health and Safety Plan will address, but is not limited to:

1. Introduction and Purpose
2. Applicable Laws and Regulations
3. Onsite Organization and Coordination
4. Medical Surveillance Program
5. Chemicals of Concern
6. Activities Hazard Analysis
7. Site Control, Work Zones, and Security Measures
8. General Safe Work Practices
9. Training
10. Personnel Protective Equipment
11. Onsite Workplans
12. Standard Operating Safety Procedures
13. Communication Procedures
14. Monitoring Plan (Personnel and Environment)
15. Decontamination Procedures
16. Work Disruption Notification Procedures
17. Onsite Worker and Community Safety
18. Emergency Response Plan, including:
    a. Contingency Plan
    b. Identification and responsibilities of an Emergency Coordinator
    c. Coordination with persons or organizations responsible for offsite emergency response (e.g., fire departments)
19. Recordkeeping
20. Requirements for Subcontractors
21. Procedures for Special Activities

The monitoring portion of the Health and Safety Plan will include monitoring programs to assure effective dust control.

B. Summary information regarding onsite potential chemical hazards is included in the Health and Safety Plan, which is provided as a reference to the CONTRACTOR. Additional data or relevant information of onsite chemical hazards can be obtained by CONTRACTOR as necessary from the PROJECT MANAGER.

C. CONTRACTOR shall prepare the Health and Safety Plan for submittal to the Department of Toxic Substances Control (DTSC) and EPA for their approval. The Health and Safety Plan shall be reviewed by the ENGINEER and OWNER and approved prior to submittal to the relevant agencies. Approval by OWNER, however, does not relieve CONTRACTOR of the responsibility to obtain approval of the plan from the review agencies. Revisions to the plan as required by OWNER or EPA shall be the responsibility of CONTRACTOR.

* * * END OF SECTION * * *

SECTION 01700
PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 DESCRIPTION

A. OWNER shall have the right to access all records, such as correspondence and claims that are maintained onsite or at any other locations by CONTRACTOR.

B. One current record copy of the following shall be maintained for OWNER:

1. Drawings.
2. Specifications.
3. Addenda.
4. Change orders and other modifications to the Contract.
5. Field orders, written instructions, or clarifications.
6. Approved submittals.
7. Field test records.
8. All associated permits.
9. Certificates of inspection and approvals.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Documents shall be maintained in a clean, dry, legible condition and in good order. Record documents shall not be used for construction purposes.

B. Documents and samples shall be available at all times for inspection by PROJECT MANAGER, CQA ENGINEER or ENGINEER.

C. Failure to properly maintain the record documents may be reason to delay a portion of the progress payments until the records comply with the Contract Documents.

1.03 RECORD DOCUMENTS

A. A record set of as-built drawings and specifications that have been legibly changed to transfer approved modifications in the completed Work that differs from the Contract Documents shall be maintained by CONTRACTOR.

B. Each document shall be labeled "PROJECT RECORD" in neat, large printed letters.

C. Information shall be recorded concurrently with construction progress.

1. No Work shall be covered over or concealed until the required information is recorded.

2. Changes made by written amendment, field order, change order, or a work directive change shall be recorded.

D. As-built drawings shall include the following information:

1. Horizontal and vertical locations of underground facilities and appurtenances, referenced to permanent surface improvements.

2. Field changes.

3. Details not on the original Drawings.

4. Location and identification of the exposed underground piping.

E. At completion of the Work:

1. Using data accumulated on blue line prints, CONTRACTOR shall have drafted a set of record drawings of the project, placing all information on reproducible mylar for the OWNER's final record. These drawings shall be suitable for ENGINEER's use in revising the CAD Drawings (as necessary) to reflect the as-built conditions.

1.04 SUBMITTALS

A. At Substantial Completion:

1. One set of record drawings shall be delivered to OWNER.

2. Documents described in Paragraph 1.01 shall be delivered to OWNER.

B. Submittals shall be accompanied with a transmittal letter, in duplicate, which contains the following:

1. Date.

2. Project title and number.

3. CONTRACTOR's name and address.

4. Title of record document.

5. Signature of CONTRACTOR or authorized representative, and approval by ENGINEER.

* * * END OF SECTION * * *

SECTION 01710
CONSTRUCTION PHOTOGRAPHS/VIDEO

PART 1 GENERAL

1.01 DESCRIPTION

A. Construction record photographs and/or video shall be taken by CQA ENGINEER periodically during the course of the Work.

1.02 PHOTOGRAPHY REQUIRED

A. Photographs and/or video shall be taken at each major stage of construction.

B. Negative and print requirements shall be as follows:

1. Negatives shall remain the property of OWNER.
2. Furnish 1 print and 1 slide to OWNER at commercial rates applicable at the time of purchase.
3. Furnish the original and one copy of each video record to OWNER.

C. OWNER shall be notified at least 5 days prior to taking the construction photographs or videos.

1.03 COSTS OF PHOTOGRAPHY

A. All costs for the specified photography and/or video and prints shall be paid for by CQA ENGINEER.

1. Additional photography, prints or videos shall be paid for by party requiring the photos.

PART 2 MATERIALS

2.01 PRINTS

A. Color print requirements shall be as follows:

1. Paper: Single weight, white base.
2. Finish: Smooth surface, glossy.
3. Size: 3-inch by 5-inch

B. Video shall be standard size for VCR playback.

C. Identify each print on the back (or label each video) by listing the following:

1. Project name.
2. Date and time of the photo.
3. Location from which the photo was taken.
4. Description of the photo.

PART 3 EXECUTION

3.01 VIEWS REQUIRED

A. Photograph or videos shall be taken from locations which adequately illustrate each phase throughout the project.

1. Consult with OWNER at each period of the photography/video for instructions concerning required views.
2. Use the same vantage point for progress photos and supply a map showing the locations of the camera for each photo.

3.02 DELIVERY OF PRINTS

A. Deliver negatives and one set of prints and slides or video to OWNER.

* * * END OF SECTION * * *

SECTION 02000
SITE PREPARATION

PART 1 GENERAL

1.01 DESCRIPTION

A. At least 3 working days before construction is to begin, CONTRACTOR shall obtain PROJECT MANAGER's approval for the location of equipment and material staging areas, temporary access, onsite roads, parking, personnel office and sanitary facilities, soil and drain rock stockpile areas, piping and geotextile storage areas, construction water storage areas, temporary fences and gates, and all other facilities which will be required for construction. The proposed locations for these facilities shall be provided on a map of the site at a scale of 1 inch equals 50 feet.

B. The areas selected for temporary facilities shall be located to prevent conflicts with existing infrastructure or other adjacent operations.

C. CONTRACTOR shall prepare the cell area, adjacent graded areas, stockpile area, and staging area as required by the Contract Documents.

D. CONTRACTOR shall locate and protect existing onsite and adjacent public utilities and improvements. Damage caused to existing utilities and improvements shall be repaired by CONTRACTOR at no additional cost to OWNER.

E. CONTRACTOR shall conduct operations and maintain the project site so as to minimize dust creation and dispersion. See Section 02050 for more detail.

F. CONTRACTOR shall recognize that the regulatory authorities regard dust control as a high priority item.

PART 2 MATERIALS

A. Materials and equipment shall be new and of adequate capacity for the required usage and meet the requirements of applicable codes and standards and approval of OWNER.

PART 3 EXECUTION

A. CONTRACTOR shall provide methods, means, and facilities required to prevent contamination of soil, water, atmosphere, uncontaminated structures, equipment or material by discharge of wastes from spills due to CONTRACTOR's operations.

B. CONTRACTOR shall provide equipment and personnel to perform emergency measures required to contain any spillages and to remove spilled materials and soils or liquids that become contaminated due to spillage. Collected spill material shall be properly disposed at no additional cost to OWNER.

* * * END OF SECTION * * *

SECTION 02020
DEMOLITION

PART 1 GENERAL

1.01 DESCRIPTION

A. CONTRACTOR shall remove or protect all aboveground and belowground structures located in the Contract Documents, and as further determined in the field during construction.

B. Should additional buried utilities be discovered beyond those indicated in the Drawings, CONTRACTOR shall immediately contact CQA ENGINEER for instructions on how to proceed.

PART 2 EXECUTION

2.01 GENERAL

A. CONTRACTOR shall demolish or otherwise remove items that are uncovered during subgrade preparation.

B. CONTRACTOR shall also protect buried utilities or structures discovered during site Work as directed by CQA ENGINEER.

C. Concrete rubble, concrete slabs and asphalt concrete shall be broken into pieces of appropriate size for disposal as designated by CQA ENGINEER, and covered by at least 2 feet of vegetative soil. Typically the sizes should be less than 2 feet by 2 feet by 2 feet.

D. Tin, plaster board, plywood, etc. shall be folded, broken or cut to appropriate size for disposal and cover as designated by CQA ENGINEER.

E. Fences are shown on the Drawings are to be protected in place.

2.02 PROTECTION OF UTILITIES

A. Contractor shall locate existing utilities prior to execution of the Work.

B. For each utility line to be retained, CONTRACTOR shall protect the line from damage during all site Work. During excavation, CONTRACTOR shall use extreme care including hand excavation, shoring, padding, and other activities as required to prevent damage.

C. All work shall comply with OSHA, NEC and other relevant safety standards.

D. Backfilling under, around and over protected utility line will be performed using equipment and methods which will not damage the pipes or conduits. Adequate backfill thickness (typically 3 feet at a minimum) must be in place and compacted over each pipe or conduit prior to allowing any vehicular traffic to cross over the alignment.

* * * END OF SECTION * * *

SECTION 02030
TEMPORARY STORMWATER RUNOFF CONTROL

PART 1 GENERAL

1.01 DESCRIPTION

A. Stormwater runoff control shall be furnished by CONTRACTOR during execution of the Work. The objective of the stormwater control is to prevent sediment runoff from the site.

B. To prevent runoff to adjacent properties and public improvements, CONTRACTOR shall provide diversion ditches, berms and other facilities, as necessary. To prevent sedimentation of runoff from disturbed areas, CONTRACTOR shall provide straw bales, detention basins, or other facilities, as required.

C. Details of CONTRACTOR stormwater runoff control measures will be provided in a written plan as outlined in Section 01410.

PART 2 MATERIALS

A. The CONTRACTOR shall have available onsite sandbags and other erosion control devices during the rainy season (October 15 to April 15).

PART 3 EXECUTION

A. Upon the indication of rain and as instructed by the PROJECT MANAGER or CQA ENGINEER, CONTRACTOR shall stop activities to allow sufficient time for placement of erosion control devices (e.g., sandbags and straw bales). CONTRACTOR shall have erosion control devices that can be installed and secured within one hour of receipt of instructions from OWNER or ENGINEER.

* * * END OF SECTION * * *

SECTION 02050
DUST CONTROL

PART 1 GENERAL

1.01 DESCRIPTION

A. This section describes dust control procedures to be employed by CONTRACTOR during site Work.

B. Dust control procedures shall be performed by CONTRACTOR in compliance with Health and Safety Plan requirements.

PART 2 MATERIALS

A. CONTRACTOR shall identify the source of water to be used during construction activities. CONTRACTOR will use the water available in Baker Tanks designated by the Project Manager prior to the source identified by CONTRACTOR.

B. If a water permit is required, a copy of the permit obtained by CONTRACTOR at his cost shall be provided to OWNER. Daily consumption records shall also be provided to PROJECT MANAGER. The cost of the water will be the responsibility of the CONTRACTOR.

C. Submittals shall be in accordance with Section 01410.

PART 3 EXECUTION

3.01 GENERAL

A. Water will be applied to areas actively being used by construction equipment. Dust control will be increased by the CONTRACTOR with instructions from the PROJECT MANAGER if complaints are made by adjacent property representatives or regulatory agencies.

B. CONTRACTOR will use discretion in the quantity of water used for dust control during soil removal activities. Overwatering may result in difficult working conditions and requirements to clean vehicles and equipment prior to traveling on public access roads.

3.02 MONITORING

A. CONTRACTOR, PROJECT MANAGER, and CQA ENGINEER shall monitor regularly and frequently to observe for visual evidence of dust generation during construction activities. Any visual evidence shall require CONTRACTOR to immediately implement further dust control measures.

* * * END OF SECTION * * *

SECTION 02070
TEMPORARY SITE ACCESS AND ONSITE ROADS

PART 1 GENERAL

1.01 DESCRIPTION

A. Designated temporary site access and onsite roads will be prepared by CONTRACTOR during construction activities. These temporary site access and onsite roads will be made available for use by others involved with the work activities.

B. CONTRACTOR shall prepare site access and onsite roads as shown in the Drawings and as follows.

1. Site access and onsite roads shall be maintained to provide positive drainage, dust control, mud control, and vehicle access. Concrete cracking and other damage at the temporary site access shall be repaired by CONTRACTOR.

2. Onsite roads shall be graded, compacted, filled and otherwise prepared to accommodate equipment to be used on the roads.

PART 2 MATERIALS

A. The onsite roads will be constructed primarily by compacting existing soils along its route; where necessary, placement of aggregate base will be utilized to improve soft areas.

PART 3 EXECUTION

A. Road preparation shall include removal of soft spots as necessary, rough grading, and moisture conditioning.

B. It shall be CONTRACTOR's responsibility to maintain the road and provide dust control as outlined in Section 02050 until completion of the project.

C. The temporary site access road shall be provided with signs by CONTRACTOR indicating restricted use of the road.

D. If, during construction activities, PROJECT MANAGER or regulatory agency feels it is necessary to monitor construction traffic, a flagperson will be provided by CONTRACTOR at no added cost to OWNER.

E. Following the completion of construction activities, the site access will be cleaned of any residual soil by CONTRACTOR to the extent required by PROJECT MANAGER or the regulatory agencies.

* * * END OF SECTION * * *

SECTION 02130
SUBGRADE PREPARATION

PART 1 GENERAL

1.01 DESCRIPTION

A. Subgrade preparation consists of excavating, filling, moisture conditioning and compacting areas of the site as shown in the Drawings. Filling will be done using onsite soils.

1.02 QUALITY CONTROL

A. The CQA ENGINEER shall observe subgrade preparation by CONTRACTOR to verify removal of rubbish, vegetation, lumber or wood, root matter or other deleterious material and proof-rolling. During proof-rolling, the CQA ENGINEER will carefully observe for excessive deformations indicating soft spots and request that CONTRACTOR repair the soft spot.

B. Structural fill shall be compacted by the CONTRACTOR and observed by the CQA ENGINEER per requirements in Section 02150.

PART 2 MATERIALS

A. The subgrade shall consist of native soils from the site area.

B. Native subgrade material shall be free of waste, vegetation, lumber or wood, root matter or other deleterious material.

C. Existing surface rocks exceeding 3 inches in size shall be removed and stockpiled at a location approved by PROJECT MANAGER.

PART 3 EXECUTION

A. CONTRACTOR shall prepare the subgrade by removing the vegetation and any other deleterious material. Existing topsoil shall be removed and stockpiled at a location approved by PROJECT MANAGER for later use for the landfill cover.

B. The entire subgrade area shall be proof-rolled with a compactor. Soft soil pockets, if any, shall be excavated and backfilled with structural fill (per requirements in Section 02150).

C. Final surfaces shall be graded to the elevations shown in the Drawings with a tolerance of 0.1 to 0.2 feet. Areas where final grades are achieved using structural fill shall be proof-rolled.

D. Excavated soil shall be stockpiled for future use at a location designated by PROJECT MANAGER.

E. Final surfaces shall be free of loose material, clods, and other debris including grade stakes and hubs.

F. The construction site shall be graded to be free-draining. In the event of rainfall, CONTRACTOR shall remove water from the construction area and condition and compact any disturbed soil to suit structural fill requirements (in Section 02150).

G. Excavated material not mixable for backfilling or site grading and other unsuitable materials shall be placed in designated spoil areas and graded to drain. Location of designated spoil areas are to be designated by PROJECT MANAGER.

* * * END OF SECTION * * *

SECTION 02180
DRAINAGE DITCH

PART 1 GENERAL

1.01 DESCRIPTION

A. CONTRACTOR shall grade and compact drainage ditches at the top of slope adjacent to school property along the northern fence line of the Brother's Machining property, along the eastern fence line of the RV Storage Lot and to the north and east of the C&E Die/Buffalo Bullet building.

PART 2 MATERIALS

A. CONTRACTOR shall grade drainage ditches into native soil material.

PART 3 EXECUTION

A. CONTRACTOR shall construct drainage ditches identified in Section 01000. The drainage ditches shall be compacted to a minimum 85 percent relative compaction (ASTM D1557) and slope to drain toward the areas shown in the Drawings.

*** END OF SECTION ***

SECTION 02190
ASPHALT BERM, TRENCHING, BACKFILLING AND COMPACTING

PART 1 GENERAL

1.01 DESCRIPTION

A. This section describes methods and equipment used to excavate, backfill and compact C&E Die/Buffalo Bullet building trench for stormdrain piping.

B. Prior to backfilling the exterior wall will be coated with Elastomeric waterproofing from the foundation to 3 feet above ground surface.

C. Trench shall be filled with materials as indicated in the Drawings. The stormdrain trench shall receive drain rock. Bedding for 6-inch PVC perforated pipe drain shall consist of fine sand with 8-ounce geotextile filter wrap and "Miradrain 6000" drainage composite (or equivalent material approved by the engineer) covering the pipe, followed by drain rock backfill and vegetative soil cover.

1.02 QUALITY CONTROL

A. Monitoring will be provided by CQA ENGINEER to verify construction meets the requirements of the Drawings and Specifications.

B. Requirements for trenching tolerances are as follows:

1. CONTRACTOR shall excavate so that liner and pipes can be laid straight at uniform grade, without sags or humps, between the elevations shown in the Drawings.
2. Clearance to other pipes and regulated boundaries will be checked by CQA ENGINEER. If clearances are found to be inadequate, CONTRACTOR will backfill trenches to compaction specifications and recut the trenches at no additional cost to OWNER.

C. CONTRACTOR shall, upon request, submit the name and address of imported materials suppliers and use materials from that source throughout the work. Change of source requires ENGINEER'S approval.

D. CONTRACTOR shall submit samples and grain size analyses of sand bedding, select backfill and drain rock material to the CQA ENGINEER for approval of the materials 7 days in advance of backfilling.

E. The CQA ENGINEER will observe all prepared excavations for evidence of soft spots, uneven bottom, clumps, improper grade, etc. and CONTRACTOR shall be required at his expense to correct any deficiencies prior to placement of pipe or backfill.

F. Backfill placement procedures will be observed by the CQA ENGINEER and moisture content and compaction tests performed (except for drain rock backfill which does not require compaction) to verify material placement in accordance with the Specifications.

1.03 JOB CONDITIONS

A. CONTRACTOR shall perform trench excavations and backfill operations in a manner so as not to damage adjacent synthetic materials or in-place pipes. CONTRACTOR shall repair or replace materials damaged during backfilling operations at no additional cost to OWNER.

PART 2 MATERIALS

2.01 BEDDING

A. Bedding material shall be fine sand meeting the following grain size requirements:

U.S. Standard Sieve	Percent Passing
3/8 inch	100
No. 4	95 to 100
No. 8	75 to 90
No. 16	55 to 75
No. 30	30 to 50
No. 50	10 to 35
No. 100	5 to 25
No. 200	0 to 20

B. Bedding material shall be free of broken concrete, broken pavement, wood, organic material, refuse or other deleterious material.

2.02 BACKFILL

A. Drain rock backfill shall meet the following grain size requirements:

U.S. Standard Sieve	Percent Passing
1-1/2 inch	100
1 inch	90 to 100
3/4 inch	55 to 85
3/8 inch	8 to 20
No. 4	0 to 5
No. 8	0 to 5
No. 200	0 to 2

B. Storm drain backfill around and above the pipe shall be select backfill material meeting the following grain size requirements:

U.S. Standard Sieve	Percent Passing
1-1/2 inch	100
1 inch	90 to 100
3/4 inch	55 to 85
3/8 inch	8 to 20
No. 4	0 to 5
No. 8	0 to 5
No. 200	0 to 2

C. Soil excavated from the trench which is free of deleterious material (e.g. broken concrete, wood, organic material) may be used for backfill above the select material as approved by the CQA ENGINEER.

PART 3 EXECUTION

3.01 INSPECTION

A. Trenches shall be examined by CONTRACTOR and CQA ENGINEER to determine existence of areas loosened by excavation, softened by flooding or weather, or of unsuitable materials.

3.02 PREPARATION

A. CONTRACTOR shall remove and replace or compact soils softened by flooding or weather as required by CQA ENGINEER.

B. CONTRACTOR shall remove unsuitable material (e.g. broken concrete, asphalt, wood, organic material, refuse or other deleterious material) from within trench.

C. Dewatering requirements are as follows:

1. Construction site shall be free-draining.
2. Excavations shall be free from water.
3. Adjacent properties shall be protected from damage resulting from dewatering operations.

3.03 EXCAVATION

A. Excavation shall be undertaken to elevations and dimensions necessary to complete construction as shown in the Drawings.

B. Excavations shall not be made until subsequent construction steps are scheduled.

C. Upon completion of excavation, CQA ENGINEER shall be notified before proceeding with further Work.

3.04 PLACING FILL

A. CQA ENGINEER shall be notified before placing fill material.

B. Fill shall not be placed in standing water.

C. Drain rock shall be placed in pipe trenches so as not to damage the pipe or underlying geosynthetics.

D. Where designated, geotextile shall be sized and placed in the trench with the remaining portion extending beyond the trench; the pipe shall be placed; backfill shall be placed; and geotextile shall be wrapped over the top of the backfill with a minimum overlap, as shown in the Drawings.

E. Storm drain trench backfill (i.e., onsite excavated soils) shall be placed at optimum ±2 percent moisture content and compacted to 90 percent relative compaction as determined by ASTM D1557-78.

F. The storm drain trench width shall be at least 12 inches wider than the pipe. The trench shall be over excavated vertically 4 to 6 inches and backfilled with clean sand compacted to minimum 90 percent relative compaction per ASTM D1557-78 for the pipe bedding. After pipe placement the select gravel backfill shall be placed in 6-inch layers and extend to 24 inches above the top of the pipe. This material shall be placed at optimum ±2 percent moisture content and computed to 90 percent relative compaction per ASTM D1557. The final backfill shall be excavated soils free of unsuitable material, compacted to 90 percent relative compaction in accordance with ASTM D1557-78.

* * * END OF SECTION * * *

SECTION 02600
REVEGETATION

PART 1 GENERAL

1.01 DESCRIPTION

A. The work specified herein includes the material, equipment, and labor necessary to place fertilizer, seed and mulch over the completed landfill area and restoration areas.

B. Work included in this section. Principal items area:

1. Surface preparation for seeding.
2. Application of fertilizer, seeding, mulch, maintenance, and warranty.

C. Quality Assurance.

1. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship to produce work of specified quality.
2. Comply fully with each manufacturer's instructions, including each step in sequence.
3. Should manufacturer's instructions conflict with contract documents, request clarification from Engineer/CQA Representative.
4. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

1.02 SUBMITTALS

A. Seed Vendors Certificate: The Contractor/Subcontractor shall submit the seed vendors certified statement for the seed mixture required, stating common name, percentage by weight, and percentages of purity and germination.

B. Fertilizer: The Contractor/Subcontractor shall submit for approval, the manufacturer's literature concerning chemical composition, chemical make-up, application rates, and application procedures.

C. Hydroseeders: The Contractor/Subcontractor shall submit for approval all data concerning hydroseeding equipment including all material application rates.

PART 2 PRODUCTS

2.01 SEED

A. Seed shall be labeled in accordance with USDA Rules and Regulations under the Federal Seed Act and applicable State seed laws. Seed shall be furnished in sealed bags or containers bearing the date of the last germination which shall be within a period of six months prior to commencement of planting operations. Seeding material shall be inspected upon arrival at the job site, and unacceptable material shall be removed from the job site. Seed shall be from same or previous year's crop; each variety of seed shall have a purity of not less than 85 percent, a percentage of germination not less than 90 percent, shall have a weed content of not more than 1 percent and contain no noxious weeds.

The Contractor/Subcontractor shall provide the proposed seed mixture, as shown on the Drawings, to be applied over areas impacted by grading activities. The proposed mixture shall list the proportions in pounds of pure live seed per acre.

2.02 FERTILIZER

A. Fertilizer shall be a starter fertilizer of commercial stock, of neutral character, with elements derived from organic sources. It shall be a complete, prepared and packaged material and shall contain a minimum of 16 percent nitrogen, 20 percent phosphoric acid and 0 percent potash. Each bag of fertilizer shall bear the manufacturer's guaranteed statement of analysis.

2.03 MULCH

A. Hydromulch

1. Provide specially prepared wood cellulose fiber, processed to contain no growth or germination inhibiting factors and dyed an appropriate color to facilitate visual metering of application of materials.

2. Hydromulch manufacturer from recycled paper products will not be acceptable

B. Mulch Tackifier. Provide material free from mineral filler, recycled cellulose fiber, clay, or other which may inhibit germination or growth of plants.

C. Water for landscaping shall be potable.

D. Product and Manufacturer

1. Provide one of the following:

a. Conwed Virgin Wood Fiber Mulch by Convered, Inc.;

b. Silva Fiber by Weyerhaeuser Co.;

c. or approved equal.

PART 3 EXECUTION

3.01 APPLICATION PROCEDURES

A. Fertilizer

1. The top 4 inches of the regraded surface shall be free of clods in excess of 3 inches in diameter, and brought to the desired line and grade.

2. The fertilizer shall be applied with a mechanical spreader at a minimum rate of 400 lbs/acre or in accordance with the manufacturer's suggested rate.

3. After the fertilizer is applied, the top surface shall be prepared by scarifying or harrowing to a depth of 2 inches and left in a roughened condition for seeding. All stiff clods, lumps, roots, litter and other foreign material shall be removed from the area and disposed of by the Contractor/Subcontractor. The areas shall also be free of stones.

B. Seeding

1. The seed mixture shall be applied uniformly upon the prepared surface with a hydroseeder at the rate of 40 pounds of seed per acre, immediately following the application of fertilizer.

C. Rolling

1. Immediately following seeding operations, except for slopes 3-horizontal to 1-vertical and greater, the entire area shall be firmed with a roller not exceeding 90 pounds for each foot of roller width.

D. Mulch

1. Mulch shall be placed immediately after the application of fertilizer and seed.

2. Mulch shall be placed with a hydroseeder at a uniform rate of 600 pounds/acre.

3. Placement of mulch will not be permitted when wind velocity is such as to prevent uniform distribution. No application shall be undertaken during inclement weather, or in the presence of free standing water or when the ground is frozen or untilled.

E. Watering

1. Following applications of the mulch, the seed bed shall be moistened. A muddy soil condition shall not be acceptable. Seeded areas shall be watered to obtain germination and to obtain and maintain growth. Watering shall be done in such a manner to prevent washing out of seed.

2. Vegetation resulting from the seeding shall not be considered satisfactory until accepted by Engineer/CQA Representative. If areas are determined to be unacceptable, the areas shall be reseeded, refertilized and remulched in accordance with the preceding application procedures.

F. Tackifier

1. Tackifier shall be sprayed over mulch immediately after application of water.

2. Tackifier shall be mixed with wood fiber and applied at a rate of 100 pounds tackifier/acre and 150 pounds wood fiber/acre.

3. Placement of tackifier will not be permitted when wind velocity is such as to prevent uniform distribution. No application shall be undertaken during inclement weather, or in the presence of free standing water or when the ground is frozen or untilled.

3.03 MAINTENANCE

A. Begin a maintenance period immediately after planting.

B. Maintain revegetated areas for a one year period.

C. Re-seeded areas shall be watered to obtain germination and to obtain and maintain satisfactory growth. Watering shall be in such a manner as to prevent washing out of seed.

* * * END OF SECTION * * *

SECTION 03361
GUNITE

PART 1 GENERAL

1.01 DESCRIPTION

A. This section includes providing all labor and equipment to place the gunite material in accordance with the drawings. The Contractor/Subcontractor may submit alternative designs (i.e., synthetic erosion mats, armor-flex, etc.) for review and approval of the Engineer/CQA Representative.

B. Work included in this section. Principal items are:

1. Furnishing materials and placing gunite.

C. Quality Assurance

1. The Contractor or Subcontractor shall provide facilities and labor as may be necessary for obtaining and testing representative test samples. Gunite shall be sampled and tested by the method given in paragraph TESTS.

2. All nozzlemen shall be certified in accordance with ACI 506.3R. Qualifications of any additional nozzlemen throughout the job shall be similarly submitted for approval.

1.02 SUBMITTALS

A.

1. Mixture Proportions.

   a. The recommended mixture proportions, sources of materials, and all test results shall be submitted for approval.

2. Aggregates.

   a. Supplier's test reports for aggregates showing the materials meet the requirements of this specification.

   b. Accelerator Compatibility Test; GA.

   c. The Contractor/Subcontractor shall establish the compatibility of the job cement and the proposed accelerators.

3. Preconstruction Test Panels.

   a. Cores and sawed concrete beams shall be taken from test panels and tested.

   b. SD-13 Certificates.

4. Portland Cement.

   a. Portland Cement shall be certified for compliance with all specification requirements.

5. Fly Ash and Other Pozzolans.

   a. Fly Ash and other Pozzolans shall be certified for compliance with all specification requirements.

6. Air-Entraining Admixture.

   a. Air-Entraining Admixture shall be certified for compliance with all specification requirements.

7. Water-Reducing or Retarding Admixtures.

   a. Water-Reducing or Retarding Admixture shall be certified for compliance with all specification requirements.

8. Curing Materials.

   a. Curing Materials shall be certified for compliance with all specification requirements.

9. Accelerating Admixture.

   a. Accelerating Admixture shall be certified for compliance with all specification requirements.

10. Steel Fiber Reinforcement.

   a. Fiber Reinforcement shall be certified for compliance with all specification requirements.

11. Qualifications.

a. The Contractor/Subcontractor shall submit a resume of experience for each nozzleman certifying that each has not less than 1 year's application time for the particular type of gunite to be applied. The resume shall include company name, address, and telephone number, name of supervisor, and detailed description of work performed.

1.03 REFERENCES

A. AMERICAN CONCRETE INSTITUTE (ACI) ACI 506.3R 1991 Certification of Shotcrete Nozzlemen

B. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) ASTM A 820 1990 Steel Fibers for Fiber Reinforced Concrete

C. ASTM C 33 1992a Concrete Aggregates

D. ASTM C 42 1990 Obtaining and Testing Drilled Cores and Sawed Beam of Concrete

E. ASTM C 78 1984 Flexural Strength of Concrete (Using Simple Beams with Third-Point Loading)

F. ASTM C 94 1992a Ready-Mixed Concrete

G. ASTM C 136 1992 Sieve Analysis of Fine and Coarse Aggregates

H. ASTM C 150 1992 Portland Cement

I. ASTM C 171 1992 Sheet Materials for Curing Concrete

J. ASTM C 231 1991b Air Content of Freshly Mixed Concrete by the Pressure Methods

K. ASTM C 260 1986 Air-Entraining Admixtures for Concrete

L. ASTM C 266 1989 Time of Setting of Hydraulic-Cement Paste by Gillmore Needles

M. ASTM C 309 1993 Liquid Membrane-Forming Compounds for Curing Concrete

N. ASTM C 494 1992 Chemical Admixture's for Concrete

O. ASTM C 566 1989 Total Moisture Content of Aggregate by Drying

P. ASTM C 595 1993 Blended Hydraulic Cements

Q. ASTM C 618 1993 Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete

R. ASTM C 685 1992a Concrete Made by Volumetric Batching and Continuous Mixing

S. ASTM C 881 1990 Epoxy-Resin-Base Bonding Systems for Concrete

T. ASTM C 1077 1992 Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation

U. ASTM D 98 1993 Calcium Chloride

V. CORPS OF ENGINEERS (COE) COE CRD-C 400 1963 Requirements for Water for Use in Mixing or Curing Concrete

PART 2 PRODUCTS

2.01 MATERIALS

A. Cement shall be portland cement and shall conform to appropriate specifications listed.

B. Aggregates shall conform to ASTM C 33, with the combined grading of coarse and fine aggregates conforming to the grading shown below.

PERCENT BY MASS PASSING INDIVIDUAL SIEVES

SIEVE SIZE	GRADING NO.
3/4 inch	—
1/2 inch	—
3/8 inch	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10

C. Use potable water for mixing.

D. Membrane-forming Curing Compound, ASTM C309, Type 1-D or Type 2.

E. Reinforcement, welded wire fabric.

F. The required compressive strength shall be 3,000 pounds per square inch at 28 days.

PART 3 EXECUTION

3.01 PRODUCTION OF GUNITE

A. The gunite shall be produced by dry-mix process.

1. Batching and Mixing.

   Aggregate and cementitious materials may be batched by weight or by volume. Weighing equipment shall be capable of batching with the accuracy specified in ASTM C 94. Volumetric equipment shall be capable of batching with the accuracy specified in ASTM C 685. The mixing equipment shall be capable of thoroughly mixing the materials in sufficient quantity to maintain placing continuity and be capable of discharging all mixed material without any carryover from one batch to the next.

2. Delivery Equipment

The equipment shall be capable of discharging the aggregate-cement mixture into the delivery hose and delivering a continuous smooth stream of uniformly mixed material to the discharge nozzle. The discharge nozzle shall be equipped with a manually operated water injection system (water ring) for directing an even distribution of water through the aggregate-cement mixture. The water valve shall be capable of ready adjustment to vary the quantity of water, and shall be convenient to the nozzleman. The water pressure at the discharge nozzle shall be sufficiently greater than the operating air pressure to ensure that the water is completely mixed with the other materials. If the line water pressure is inadequate, a water pump shall be introduced into the line. The water pressure shall be uniformly steady (nonpulsating). The delivery equipment shall be thoroughly cleaned at the end of each shift. Equipment parts, especially the nozzle liner and water ring, shall be regularly inspected and replaced as required.

3.02 PREPARATION OF SURFACES

A. Earth shall be compacted and trimmed to line and graded before placement of gunite. Surfaces to receive gunite shall be dampened.

3.03 PLACEMENT OF GUNITE

A. Gunite shall be placed using suitable delivery equipment and procedures. The area to which gunite is to be applied shall be clean and free of rebound or overspray.

B. Placement Techniques

1. Thickness, method of support, air pressure, and water content of gunite shall be controlled to preclude sagging or sloughing off. Shotcreting shall be discontinued or suitable means shall be provided to screen the nozzle stream if wind or air currents cause separation of the nozzle stream during placement.

2. Horizontal and vertical corners and any area where rebound cannot escape or be blown free shall be filled first.

3. The nozzle shall be held at such distance and angle to place material behind reinforcement before any material is allowed to accumulate on the face of the reinforcement. In the dry-mix process, additional water may be added to the mixture when encasing reinforcement to facilitate a smooth flow of material behind the bars. Gunite shall not be placed through more than one layer of reinforcing steel rods or mesh in one application unless demonstrated by preconstruction tests that steel is properly encased.

4. The following precautions shall be taken during placement.

   a. Placement shall be stopped if drying or stiffening of the mixture takes place at any time prior to delivery to the nozzle.

   b. Rebound or previously expended material shall not be used in the gunite mixture.

3.04 REPAIR OF SURFACE DEFECTS

A. Surface Defects

1. All gunite which lacking uniformity, exhibiting segregation, honeycombing, or lamination, or which containing any dry patches, slugs, voids, or sand pockets shall be removed in accordance with the procedures described in this specification.

2. All repairs shall be made within 1 week of the time the deficiency is discovered. All unacceptable materials shall be removed and repaired by the procedures described in the following two paragraphs. Voids and holes left by the removal of tie rods in all permanently exposed surfaces not too be backfilled and in surfaces to be exposed to water shall be reamed and completely filled with dry-patching mortar as specified below.

3. Minor patching may be accomplished with a dry-pack mixture, fine sand, and cement or with materials as approved. Patches that exceed 3000 cubic centimeters (0.1 cubic foot) in volume shall receive a brush coat of approved epoxy resin meeting ASTM C 881, Type II, as a prime coat. Care shall be taken not to spill epoxy or overcoat the repair surface so that the epoxy runs or is squeezed out onto the surface which will remain exposed to view.

4. Core holes shall not be repaired with gunite. Instead, they shall be filled solid with a dry-pack mixture, after being cleaned and thoroughly dampened.

3.05 FINISHING

A. Cutting Screed

1. After the surface has taken its initial set (crumbling slightly when cut), excess material outside the forms and ground wires shall be sliced off with a downward cutting motion using a sharp-edged cutting screed.

3.06 CURING AND PROTECTION

A. Immediately after finishing, gunite shall be kept continuously moist for at least 3 days. One of the following materials or methods shall be used:

1. Ponding or continuous sprinkling.

2. Absorptive mat or fabric, sand, or other covering kept continuously wet.

3. Curing Compounds On natural gun or flash finishes, use the coverage application requirement of 2.5 square meters per liter(100 square feet per gallon) or twice the manufacturer's requirement, whichever is less. Curing compounds shall not be used on any surfaces against which additional gunite or other cementitious finishing materials are to be bonded unless positive measures, such as sandblasting, are taken to completely remove curing compounds prior to the application of such additional materials.

B. Curing shall be continued for the first 7 days after shotcreting or until the required strength is obtained.

3.07 TESTS

A. Test specimens shall be initially cured onsite, then be transported in an approved manner to an approved testing laboratory meeting the requirements of ASTM C 1077 within 48 hours of scheduled testing time.

B. The compressive strength of the concrete shall be determined from the average of all test specimens representing a specific batch of concrete and tested on the 8th day after fabrication.

C. Aggregate Moisture

1. During a shift and prior to batching the gunite, the moisture content shall be determined for the coarse and fine aggregate in accordance with ASTM C 566. The available free moisture shall be subtracted from the batching water. The amount of free moisture in kilograms per cubic meter (pounds per cubic yard) shall be recorded on the batching ticket.

D. Grading

1. Testing the grading of the coarse and fine aggregate shall be in accordance with ASTM C 136.

E. Depth

1. The unhardened gunite shall be checked for depth using a probe by the nozzleman or laborer at the time of placement. These depth checks shall be at 15 minute intervals and all low or thin areas shall be corrected by applying additional gunite.

F. Mixture Proportions

1. Record and check mixture proportions at least once per shift for weigh batching. Record and check mixture proportions as recommended by ASTM C 685 for volumetric batching and continuous mixing plants.

G. Preparations

1. Prior to each placement of gunite, the Engineer/CQA Representative shall certify in writing or by an approved checkout form that cleanup and preparations are in accordance with the plans and specifications.

* * * END OF SECTION * * *

ATTACHMENT 3

HYDRAULIC CALCULATIONS

TRC

TRC

By ______ Date ______ Subject ______ Sheet No. 0 of 20

Chkd. By ______ Date ______ Proj. No. 94-256.

WASTE DISPOSAL INC SUPERFUND SITE
HYDROLOGY CALCULATIONS

WASTE DISPOSAL INC SUPERFUND SITE HYDROLOGY CALCULATIONS

INTRODUCTION : REMEDIAL MEASURES AT THE SITE INCLUDES GRADING TO ENHANCE SURFACE RUNOFF AND MINIMIZE INFILTRATION. THE GRADING PLAN IS SHOWN IN FIGURE 1 (SHEET 20).

PURPOSE : THE PURPOSE OF THESE CALCULATIONS IS TO COMPUTE THE PEAK RUNOFF DUE TO A 50-YEAR STORM EVENT

REFERENCES

1 - LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS, HYDROLOGY MANUAL (LACDPW)
2 - US DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION "DESIGN OF SMALL DAMS, APPENDIX A 1977

METHODOLOGY : THE RATIONAL METHOD WAS USED TO CALCULATE THE TIME OF CONCENTRATION FOR EACH DRAINAGE AREA. THEN, THE COMPUTED TIME OF CONCENTRATION WAS USED TO ESTIMATE RAINFALL INTENSITY FOR THE 50 YR STORM AND THE PEAK RUNOFF IS CALCULATED

$$Q = CIA$$

Q = PEAK FLOW RATE IN CUBIC FEET PER SECOND (CFS)

TRC

By J B Date 9/6/98 Subject WASTE DISPOSAL INC. Sheet No. 2 of 20
Chkd. By KRR Date 9/8/98 HYDROLOGY CALCULATIONS Proj. No. 94-256

C = RUNOFF COEFFICIENT

I = RAINFALL INTENSITY FOR THE TIME OF CONCENTRATION AT THE DESIGN POINT IN INCHES PER HOUR (IN/HR)

A = DRAINAGE AREA IN ACRES

DRAINAGE AREA	AREA (in^2)	AREA (ACRES)	
A	5.82	$\frac{5.82\,(50)^2}{43{,}560} =$	.33
B1	22.05	$\frac{22.05\,(50)^2}{43{,}560} =$	1.27
B2	9.38	$\frac{9.38\,(50)^2}{43{,}560} =$	.54
B3	24.45	$\frac{24.45\,(50)^2}{43{,}560} =$	1.40
C	14.21	$\frac{14.21\,(50)^2}{43{,}560} =$	.82
D	19.58	$\frac{19.58\,(50)^2}{43{,}560} =$	1.12
E1	16.42	$\frac{16.42\,(50)^2}{43{,}560} =$	.94
E2	18.33	$\frac{18.33\,(50)^2}{43{,}560} =$	1.05
F	19.45	$\frac{19.45\,(50)^2}{43{,}560} =$	1.12
G	13.86	$\frac{13.86\,(50)^2}{43{,}560} =$	.80
H	49.17	$\frac{49.17\,(50)^2}{43{,}560} =$	2.82
I	9.44	$\frac{9.44\,(50)^2}{43{,}560} =$	.54
J1	17.91	$\frac{17.91\,(56)^2}{43{,}560} =$	1.03

Recyclable and made from recycled paper.

DRAINAGE AREA	AREA (IN^2)	AREA (ACRES)
J_2	5.82	$\frac{5.82(50)^2}{43560} = .33$
K	3.35	$\frac{3.35(50)^2}{43560} = .19$
L	7.23	$\frac{7.23(50)^2}{43560} = .41$
M_1	14.74	$\frac{14.74(50)^2}{43560} = .85$
M_2	5.42	$\frac{5.42(50)^2}{43560} = .31$

LOCATION : SEE SHEET 4

DRAINAGE AREA A

AREA = .33 ACRES

HIGH POINT : 170 FT
LOW POINT : 165 FT

$H = 170 - 165 = 5.0$

$L = 175$ FT

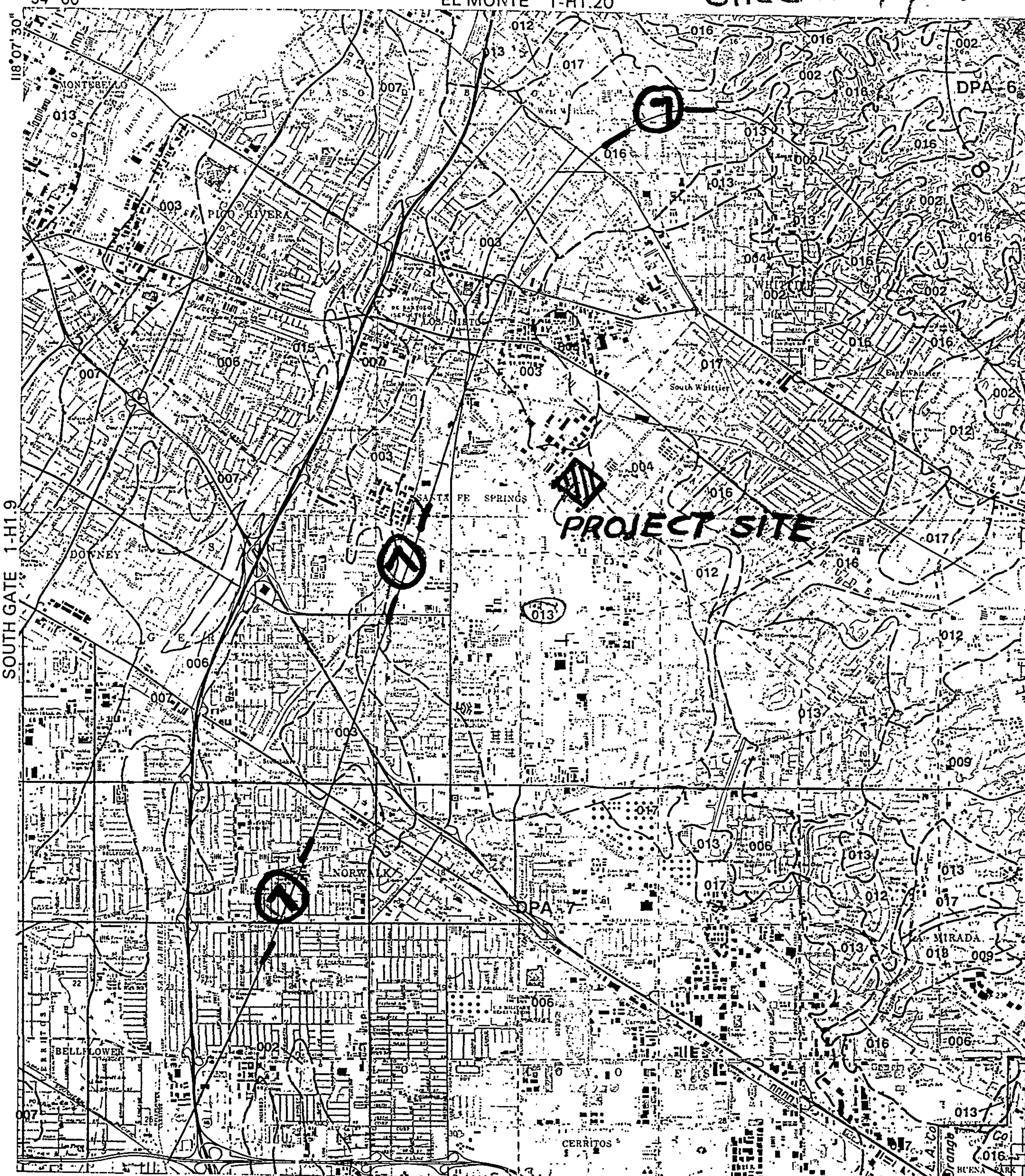
$T_c = 8.7$ MIN (SHEET 5)

$I = 3.4$ INCHES/HR (SHEET 6)

RUNOFF COEFFICIENT "C

ASSUME LOW PERMEABILITY GRADED LAND

SHEET 4 / 20



LEGEND

— — — SOIL CLASSIFICATION AREA

.... DEBRIS POTENTIAL AREA

(K) RAINFALL ZONE

—12— 50-YEAR ISOHYET (MAX. 24-HOUR AMOUNT)

LACDPW

0 FEET 5000

WHITTIER **1981**

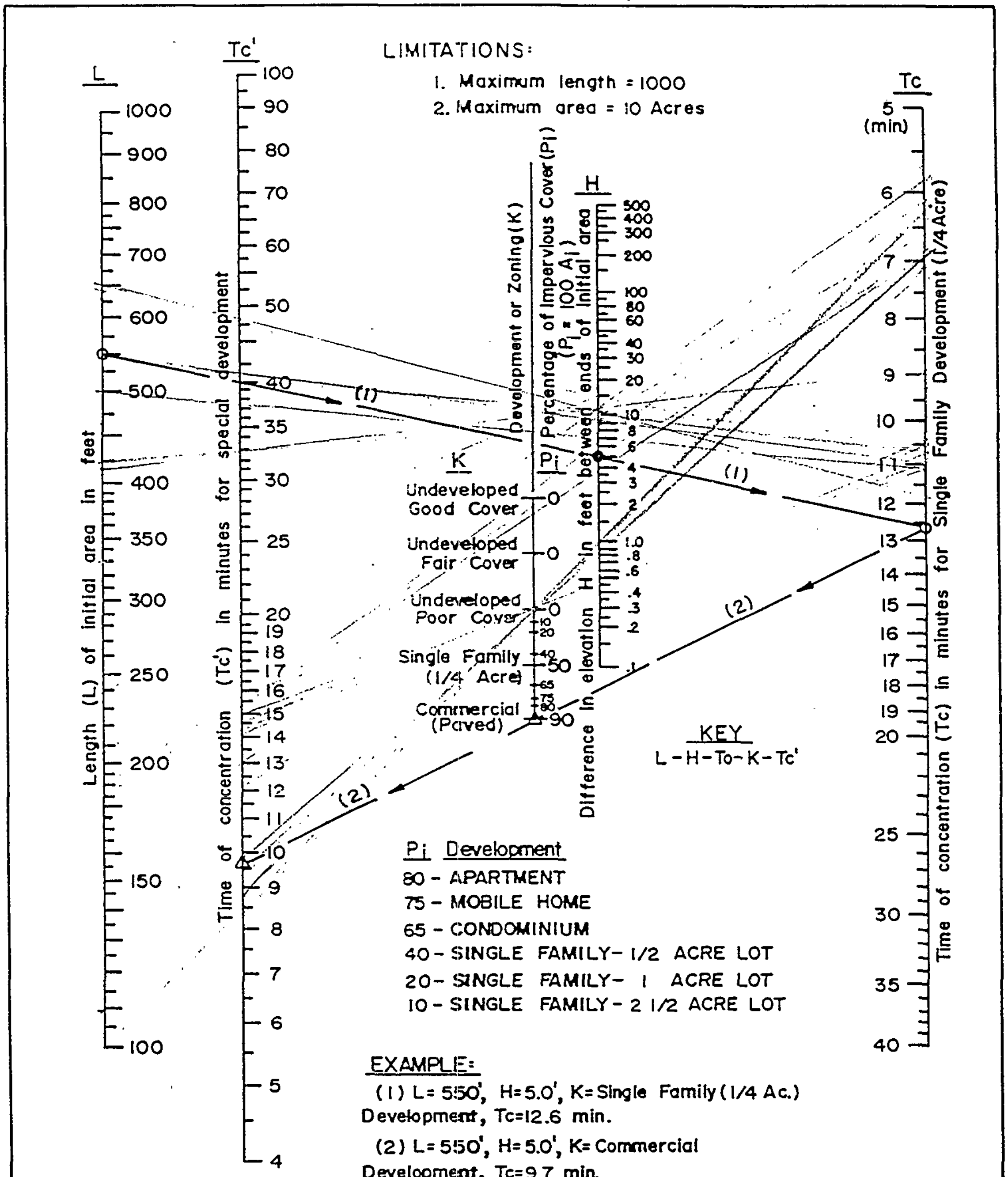
hydrologic map

Hydrology/Sedimentation Appendix

(FROM DEF. 1).

1-H1-10

SHEET 5/20



TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Fig. 4.2

TRC

By J.B Date 9/6/98 Subject WASTE DISPOSAL INC. Sheet No. 7 of 20

Chkd. By KRL Date 9/8/98 HYDROLOGY CALCULATIONS Proj. No. 94-256

SOIL GROUP. D

CN = SCS CURVE NUMBER = 93 (SHEET 8)

MAX 24-HOUR STORM RAINFALL, P = 7 INCHES
(FROM SHEET 4)

⇒ 24-HOUR STORM RUNOFF, R = 6.1 INCHES
(FROM SHEET 9)

$RATIO = \frac{6.1}{7} = .87$

$\Rightarrow C = .87$

$Q_{50} = C I_{50} A$

$Q_{50} = .87 \times 3.4 \times .33 =$

$Q_{50} = 1.0$ CFS (SHEET FLOW)

<u>DRAINAGE AREA B1</u>

AREA = 1.27 ACRES

HIGH POINT = 170.6
LOW POINT = 161.5

H = 170.6 − 161.5 = 9.10 FT

L = 448 FT

Tc = 13 MIN (DISREGARD Tc ALONG DITCH)

Recyclable and made from recycled paper.

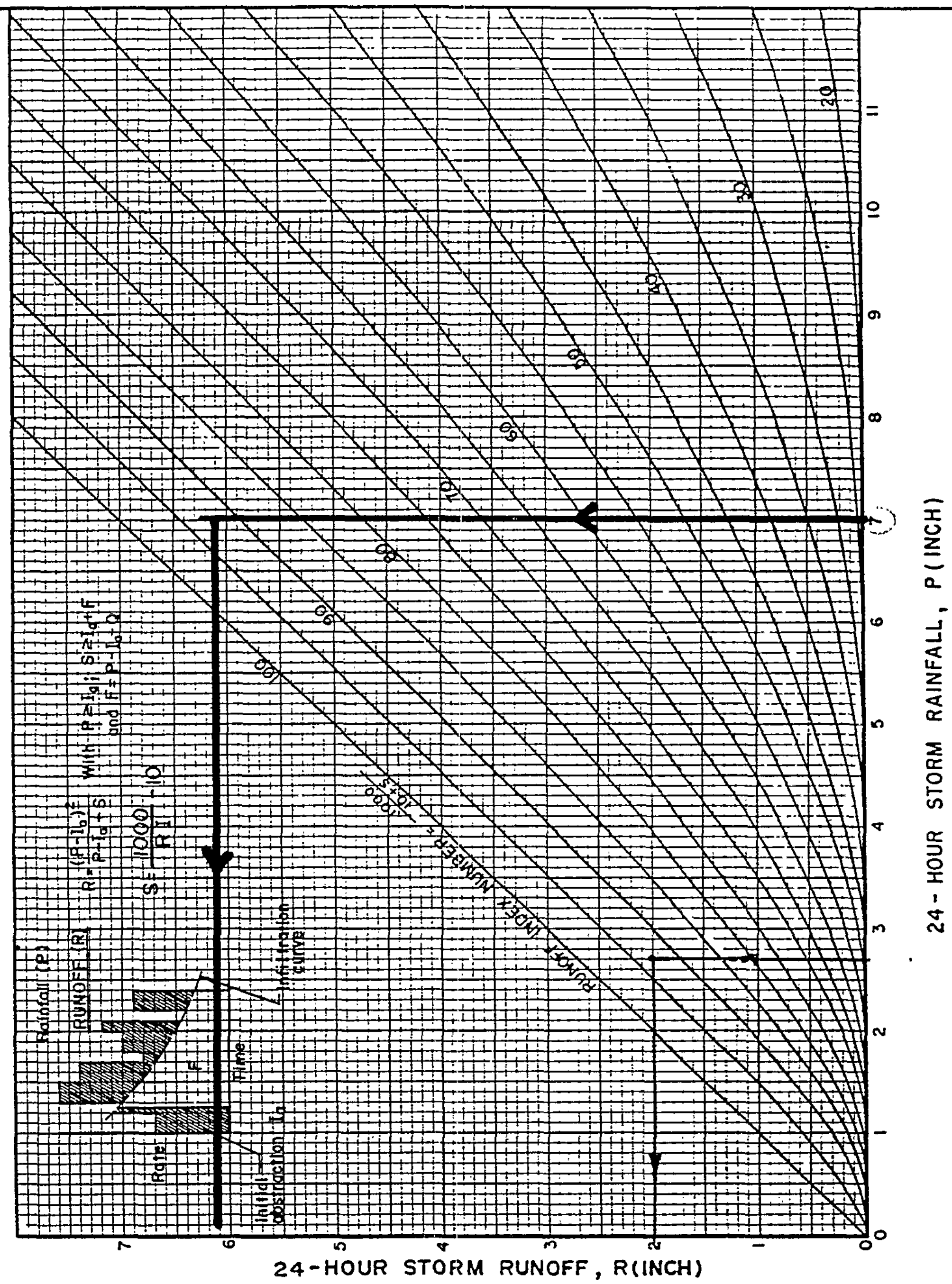
Runoff Index Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II					
Cover Type	Quality of Cover (2)	Soil Group			
		A	B	C	D
NATURAL COVERS -					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparrel, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparrel, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	71	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent.)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	25	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
URBAN COVERS -					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
AGRICULTURAL COVERS -					
Fallow (Land plowed but not tilled or seeded)		77	86	91	94

AS USED ON SHEET 7

Fig. 3.2 (1 of 2)

RUNOFF INDEX NUMBERS FOR PERVIOUS AREAS

(FROM REF. 2)



S.C.S. 24-HOUR STORM RAINFALL-RUNOFF RELATIONSHIPS

Fig. 3.5

FROM REF. 2

$I = 2.78$ (SHEET 6)

$Q_{50} = .87 \times 2.78 \times 1.27$
$Q_{50} = 3.07$ CFS

DRAINAGE AREA B_2

AREA = .54 AC

HIGH POINT = 170.6
LOW POINT = 158.8

$H = 170.6 - 158.8 = 11.8$ FT

$L = 205$ FT

$T_c = 8$ MIN (SHEET 5)

$I = 3.60$ INCHES/HR (SHEET 6)

$Q_{50} = .87 \times 3.60 \times .54 = 1.7$ CFS

DRAINAGE AREA B_3

AREA = 1.40 AC

HIGH POINT = 170.6 FT
LOW POINT = 155 FT

TRC

By J. B Date 8/6/98 Subject WASTE DISPOSAL INC Sheet No. 11 of 20

Chkd. By KB2 Date 9/8/98 HYDROLOGY CALCULATIONS Proj. No. 94-256

H = 170.6 − 155 = 15.60 FT

L = 305 (DISREGARD Tc ALONG DITCH

Tc = 10 MIN (SHEET 5)

I = 3.25 INCHES/HR (SHEET 6)

Q_{50} = .87 × 3.25 × 1.40

Q_{50} = 4.0 CFS

<u>DRAINAGE AREA C</u>

AREA = .82 Ac

HIGH POINT: 165.5 FT
LOW POINT 153.5 FT

H = 165.5 − 153.5 = 12 FT

L = 414 FT

Tc = 12 MIN (SHEET 5)

I = 2.9 INCHES/HR (SHEET 6)

Q_{50} = .87 × 2.9 × .82
Q_{50} = 2.1 CFS

TRC

By J.B Date 8/7/98 Subject WASTE DISPOSAL INC Sheet No. 12. of 20
Chkd. By KRL Date 9/8/98 HYDROLOGY CALCULATIONS Proj. No. 94-256

DRAINAGE AREA D

AREA = 1.12 AC

HIGH POINT . 169 FT
LOW POINT : 153.5 FT

H = 169 - 153.5 = 15.5 FT

L = 630 FT

Tc = 15 MIN (SHEET 5)

I = 2.6 INCHES / HR (SHEET 6)

Q_{50} = .87 × 2.6 × 1.12 =
Q_{50} · 2.5 CFS

DRAINAGE AREA E:

AREA = .94 AC

HIGH POINT = 170.6
LOW POINT = 161

H = 170.6 - 161 = 9.60 FT

L = 515

Tc = 15 MIN (SHEET 5)

I = 2.6 INCHES / HR (SHEET 6)

TRC

By J B Date 8/7/98 Subject WASTE DISPOSAL INC Sheet No. 8 of 20

Chkd. By VBL Date 9/8/98 HYDROLOGY CALCULATIONS Proj. No. 94-256

$Q_{50} = .87 \times 2.6 \times .94$

$Q_{50} = 2.1$ CFS

DRAINAGE AREA E_2

AREA = 1.05 AC

HIGH POINT = 170.6 FT

LOW POINT = 159.5

H = 170.6 - 159.5 = 11.1 FT

L = 550 FT

Tc = 14 MIN (SHEET 5)

I = 2.6 INCHES / HR (SHEET 6)

$Q_{50} = .87 \times 2.6 \times 1.05$

$Q_{50} = 2.4$ CFS

DRAINAGE AREA F

AREA = 1.12 AC

HIGH POINT = 170.6 FT

LOW POINT = 159.5 FT

H = 170.6 - 159.5 = 11.1 FT

L = 650 FT

T_C = 16 MIN (SHEET 5)

I = 2.5 INCHES/HR (SHEET 6)

Q_{50} = .87 x 2.5 x 1.12
Q_{50} = 2.4 CFS

DRAINAGE AREA (G)

AREA = .80 ACRES

HIGH POINT = 170.6 FT
LOW POINT = 160 FT

H = 170.6 - 160 = 10.6 FT

L = 540 FT

T_C = 14.5 MIN (SHEET 5)

I = 2.65 INCHES/HR (SHEET 6)

Q_{50} = .87 x 2.65 x .80
Q_{50} = 1.8 CFS

DRAINAGE AREA (H)

AREA = 2.82 ACRES

HIGH POINT : 170.6 FT
LOW POINT : 159.5 FT

H = 11.1 FT

L = 530 FT

Tc = 14 MIN (SHEET 5)

I = 2.65 INCHES / HR (SHEET 6)

$Q_{50} = .87 \times 2.65 \times 2.82$
$Q_{50} = 6.50$ CFS

DRAINAGE AREA (I)

AREA = .54 ACRES

HIGH POINT = 165.5 FT
LOW POINT = 159.0 FT

H = 6.50 FT

L = 180 FT

Tc = 8.5 MIN (SHEET 5)

I = 3.5 INCHES / HR (SHEET 6)

$Q_{50} = .87 \times 3.5 \times .54$
$Q_{50} = 1.6$ CFS

TRC

By J B Date 9/7/98 Subject WASTE DISPOSAL INC Sheet No. 16 of 20
Chkd. By WR Date 9/8/98 HYDROLOGY CALCULATIONS Proj. No. 94-256

DRAINAGE AREA (J1)

AREA = 1.03 ACRES

HIGH POINT . 168.5
LOW POINT 161.5

H = 168.5 - 161.5 = 7.0 FT

L = 500 FT

Tc = 15 MIN (SHEET 5)

I = 2.6 INCHES / HR (SHEET 6)

Q50 = .87 × 2.6 × 1.03 =
Q50 = 2.3 CFS

DRAINAGE AREA (K)

AREA = .19 ACRES

HIGH POINT : 165.5 FT
LOW POINT ≈ 155

H = 165.5 - 155 = 10.5 FT

L = 240 FT

Tc = 9 MIN (SHEET 5)

I = 3.4 INCHES / HR
Q50 = .87 × 3.4 × .19 = .6 CFS

TRC

By J.B Date 9/7/98 Subject WASTE DISPOSAL INC Sheet No. 17 of 20

Chkd. By KL Date 9/8/98 HYDROLOGY CALCULATIONS Proj. No. 91-256

DRAINAGE AREA L.

AREA - .41 ACRES

HIGH POINT 164FT
LOW POINT = 154.5

H = 164 - 156 = 9.5 FT

L = 120 FT

Tc = 7 MIN (SHEET 5)

I = 3.9 INCHES/HR (SHEET 6)

$Q_{50} = .87 \times 3.9 \times .41$
$Q_{50} = 1.4$ CFS

DRAINAGE AREA J_2

AREA - .33 ACRES

HIGH POINT: 166 FT
LOW POINT : 161.5 FT

H = 166 - 161.5 = 4.5 FT

L = 190 FT

Tc = 10 MIN (SHEET 5)

TRC

By J. B Date 9/7/98 Subject WASTE DISPOSAL INC Sheet No. 18 of 20

Chkd. By [illegible] Date 9/8/98 HYDROLOGY CALCULATIONS Proj. No. 94-256

I = 3.25 INCH / HR (SHEET 6)

$Q_{50} = .87 \times 3.25 \times .33$

$Q_{50} = .9$ CFS

DRAINAGE AREA M_1

AREA = .85 ACRES

HIGH POINT 170.6

LOW POINT 166.2

H = 170.6 − 166.2 = 4.40 FT

L = 185 FT

T_c = 10 MIN (SHEET 5)

I = 3.25 INCH / HR (SHEET 6)

$Q_{50} = .87 \times 3.25 \times .85$

$Q_{50} = 2.40$ CFS

DRAINAGE AREA M_2

AREA = .31 ACRES

HIGH POINT 167.6

LOW POINT 166.2

H = 167.6 − 166.5 = 1.40

Recyclable and made from recycled paper.

L = 75 FT , USE 100

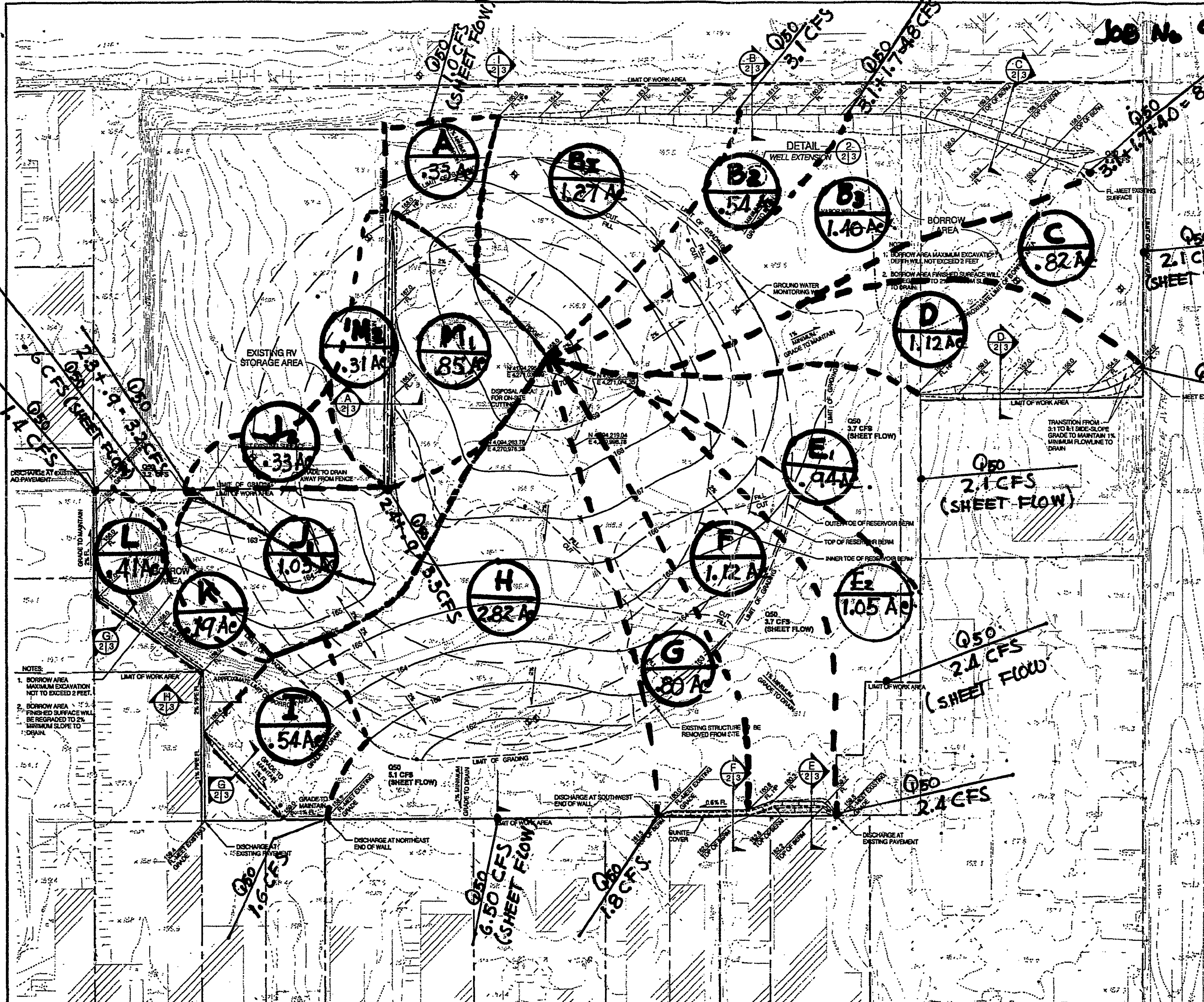
Tc = 8.5 MIN (SHEET 5)

I = 3.5 INCH/HR (SHEET 6)

$Q_{50} = .87 \times 3.50 \times .31$

$Q_{50} = .9$ CFS

JOB No 94-256. SHEET 20/20



NOTES:

1. GRADES ARE SHOWN AT THE TOP OF FINAL COVER AND FINISHED SURFACE.
2. ALL AREAS WITHIN THE OUTER TOE OF RESERVOIR BERM SHALL BE REGRADED TO ACHIEVE A 2% MINIMUM SLOPE IN ORDER TO MAINTAIN ADEQUATE SURFACE DRAINAGE.
3. ALL AREAS OUTSIDE THE OUTER TOE OF RESERVOIR BERM SHALL BE REGRADED TO ACHIEVE A 1% MINIMUM SLOPE IN ORDER TO MAINTAIN ADEQUATE SURFACE DRAINAGE.
4. IF IMPACTED SOILS ARE EXCAVATED DURING DRAINAGE DITCH CONSTRUCTION, THIS MATERIAL WILL BE PLACED AS FILL WITHIN THE LIMIT OF GRADING AND COVERED WITH 2 FEET MINIMUM THICKNESS OF FINAL COVER MATERIAL.
5. DRAINAGE DITCHES AND DRAINAGE CONTROL BERMS SHALL BE LOCATED TO AVOID EXISTING MONITORING WELLS.
6. FIELD VERIFY LOCATIONS OF WELLS SHOWN ON THIS DRAWING.

EARTHWORK SUMMARY DATA

	CUT, cy	FILL, cy
REGRADED AREA OVER RESERVOIR	5,785	7,425
DRAINAGE DITCH AND BERM CONSTRUCTION	1,170	200
ON-SITE EXCAVATED MATERIAL (PRESENTLY STORED IN 55-GAL. DRUMS AND ROLL-OFF BINS)	250	
BORROW AREAS	420 (1)	
TOTALS	7,625 CY (2)	7,625 CY

(1) REPRESENTS AN AVERAGE EXCAVATION OF APPROXIMATELY 5 IN. OVER BORROW AREAS AS SHOWN ON PLAN.
(2) ASSUMES FINAL PLACEMENT DENSITY EQUALS EXISTING IN-PLACE DENSITY.

FIGURE 1.

0 50 100 FEET
SCALE

ISSUED FOR REVIEW ONLY
NOT FOR CONSTRUCTION

A	03/04/96	ISSUED FOR REVIEW	BAU	RN
REV	DATE	DESCRIPTION	DRAWN BY	CHECKED BY

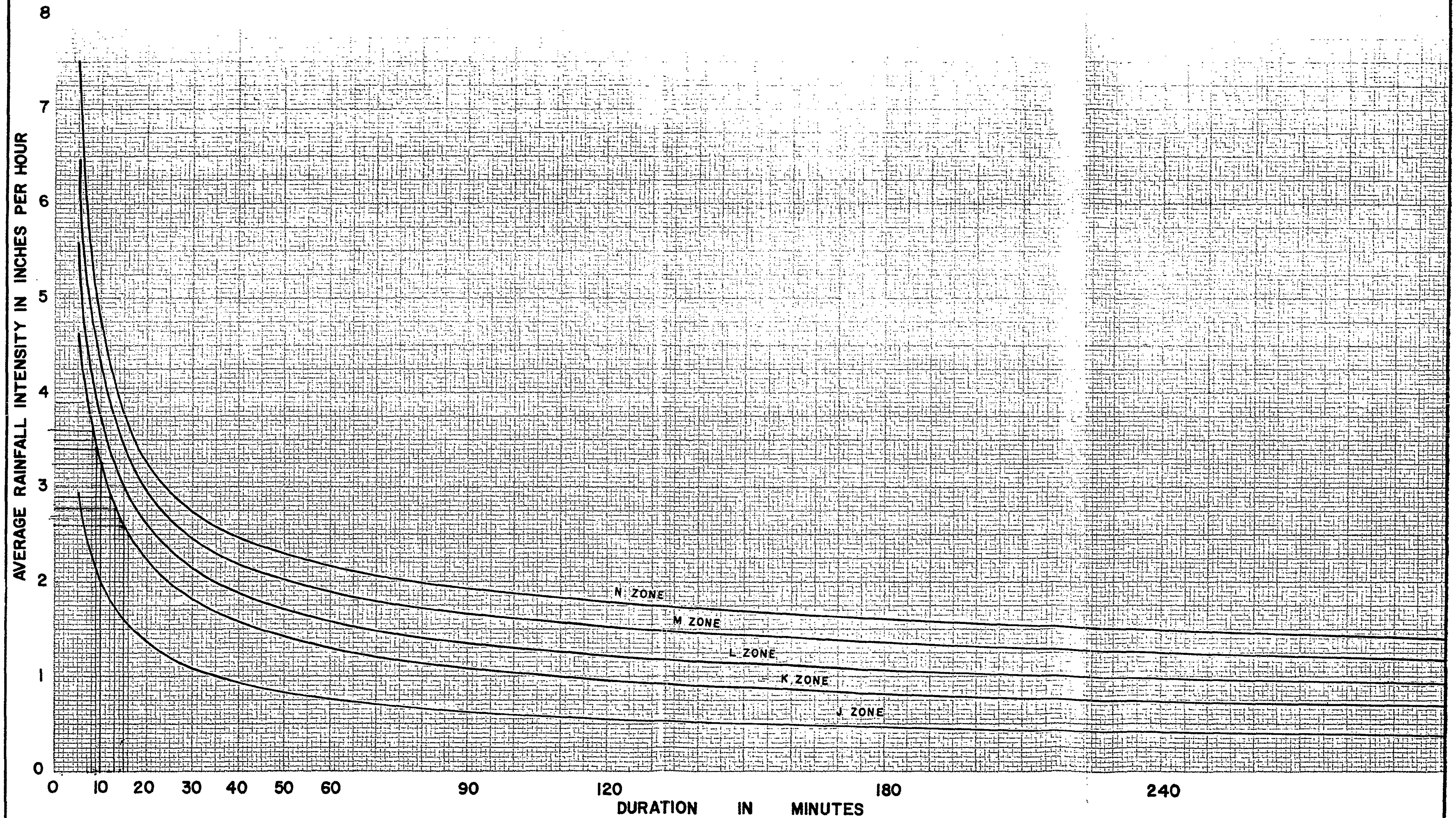
DRAWN BY: R. JONES

WASTE DISPOSAL INC. SUPERFUND SITE
TECHNICAL MEMORANDUM NO. 11 - RESERVOIR AREA GRADING AND WASTE/DEBRIS MANAGEMENT
SANTA FE SPRINGS CALIFORNIA

TITLE: SURFACE WATER MANAGEMENT INTERIM GRADING PLAN

JOB NO.	SCALE	DRAWING NO.
94-256	AS NOTED	D-94256-RD002

TRC | REVISION A | SHEET 2



L A C F C D *hydrology manual*

AVERAGE RAINFALL INTENSITY
DURATION CURVES
RECURRENCE INTERVAL 50 YEARS

Figure C-2

TRC ENVIRONMENTAL SOLUTIONS, INC.

By AV Date 8/21/98 Subject N.D.I. PRELIM. GRADING PLAN Sheet No. ____ of ____

Chkd. By ____ Date ____ RESERVOIR RE-GRADING QUANTITIES Proj. No. ____

MEASURED AT 1" = 50 FT.

CUT						FILL					
ELEV., FT.	PLANIMETER READING, IN²	AVERAGE, IN²	X (50)² = FT²	ΔH, FT	FT² × ΔH ÷ 27 = YD³	ELEV., FT	PLANIMETER READING, IN²	AVERAGE, IN²	X (50)² = FT²	ΔH, FT	FT² × ΔH ÷ 27 = YD³
170.7	—					170.7	0				
170	—					170	2.8	1.4	3500	0.7	71
169	—					169	14.4	8.6		1	796
168	—					168	32.0	23.2		1	2,148
167	2.2	1.1	2750	0.7	71	167	24.4	28.2		1	2,611
166	20.0	11.1		1	1,028	166	5.8	15.1		1	1,398
165	17.8	18.9		1	1,750	165	0.6	3.2		1	296
164	14.2	16.0		1	1,481	164	0.4	0.5		1	46
163	7.0	10.6		1	981	163	0.2	0.3		1	28
162	1.6	4.3		1	393	162	—	0.1		1	9
161	0	0.8		1	74	161	0				
		TOTAL YD³			5,783			TOTAL YD³			7,423

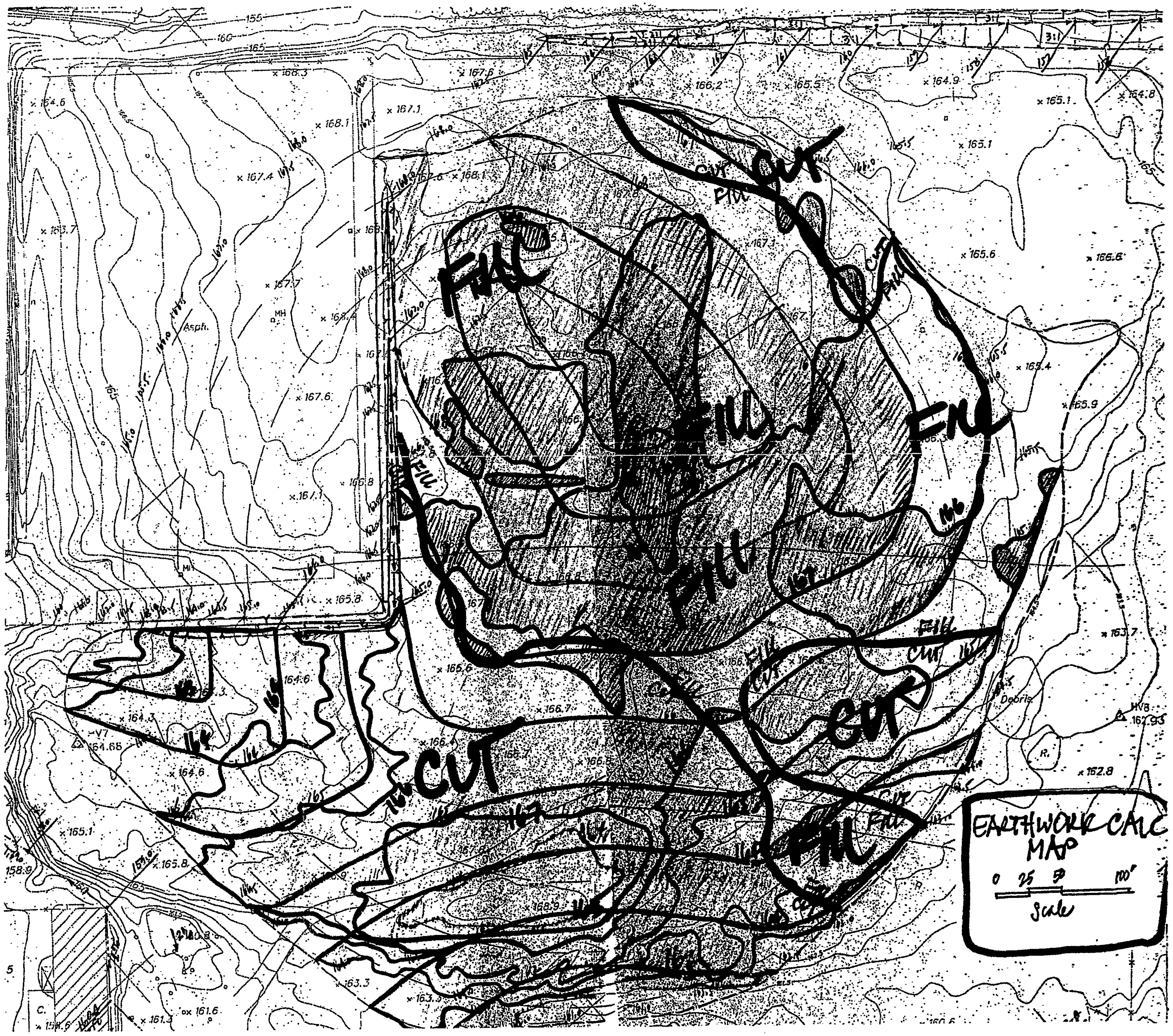
GRADED AREA = 327,475 SF = 7.5 AC.

NET: 7,423 - 5783 = 1640 cy FILL REQUIRED

DITCH & BERM CONSTRUCTION:
NET: 970 cy CUT
1640 - 970 = 670 cy FILL REQ.

DRUM QUANTITIES: 55 GAL ÷ 7.48 GAL/CF = 7.35 CF/DRUM
ASSUME 550 DRUMS @ 7.35 CF/DRUM = 4042.5 CF = 149.7 cy
ADD 149.7 cy TO NET:

1640 cy FILL REQUIRED
LESS — 970 cy CUT FROM DITCHES
LESS — 150 cy FILL FROM DRUMS
520 cy FILL REQUIRED FROM BORROW AREAS (SEE GRADING PLAN FOR BORROW AREA LOCATION)



ATTACHMENT 4

SUPERFUND LAND DISPOSAL RESTRICTIONS; GUIDE 5

TRC

EPA

Superfund LDR Guide #5

Determining When Land Disposal Restrictions (LDRs) Are Applicable to CERCLA Response Actions

CERCLA Section 121(d)(2) specifies that on-site Superfund remedial actions shall attain "other Federal standards, requirements, criteria, limitations, or more stringent State requirements that are determined to be legally applicable or relevant and appropriate (ARAR) to the specified circumstances at the site." In addition, the National Contingency Plan (NCP) requires that on-site removal actions attain ARARs to the extent practicable. Off-site removal and remedial actions must comply with legally applicable requirements. **This guide outlines the process used to determine whether the Resource Conservation and Recovery Act (RCRA) land disposal restrictions (LDRs) established under the Hazardous and Solid Waste Amendments (HSWA) are "applicable" to a CERCLA response action.** More detailed guidance on Superfund compliance with the LDRs is being prepared by the Office of Solid Waste and Emergency Response (OSWER).

For the LDRs to be applicable to a CERCLA response, the action must constitute placement of a restricted RCRA hazardous waste. Therefore, site managers (OSCs, RPMs) must answer three separate questions to determine if the LDRs are applicable:

(1) Does the response action constitute placement?

(2) Is the CERCLA substance being placed also a RCRA hazardous waste? and if so

(3) Is the RCRA waste restricted under the LDRs?

Site managers also must determine if the CERCLA substances are California list wastes, which are a distinct category of RCRA hazardous wastes restricted under the LDRs (see Superfund LDR Guide #2).

(1) DOES THE RESPONSE CONSTITUTE PLACEMENT?

The LDRs place specific restrictions (e.g., treatment of waste to concentration levels) on RCRA hazardous wastes prior to their placement in land disposal units. Therefore, a key determination is whether the response action will constitute placement of wastes into a land disposal unit. As defined by RCRA, land disposal units include landfills, surface impoundments, waste piles, injection wells, land treatment facilities, salt dome formations, underground mines or caves, and concrete bunkers or vaults. If a CERCLA response includes disposal of wastes in any of these types of off-site land disposal units, placement will occur. However, uncontrolled hazardous waste sites often have widespread and dispersed contamination, making the concept of a RCRA unit less useful for actions involving on-site disposal of wastes. Therefore, to assist in defining when "placement" does and does not occur for CERCLA actions involving on-site disposal of wastes, EPA uses the concept of "areas of contamination" (AOCs), which may be viewed as equivalent to RCRA units, for the purposes of LDR applicability determinations.

An AOC is delineated by the areal extent (or boundary) of contiguous contamination. Such contamination must be continuous, but may contain varying types and concentrations of hazardous substances. Depending on site characteristics, one or more AOCs may be delineated. Highlight 1 provides some examples of AOCs.

Highlight 1: EXAMPLES OF AREAS OF CONTAMINATION (AOCs)

- A waste source (e.g., waste pit, landfill, waste pile) and the surrounding contaminated soil.
- A waste source, and the sediments in a stream contaminated by the source, where the contamination is continuous from the source to the sediments.*
- Several lagoons separated only by dikes, where the dikes are contaminated and the lagoons share a common liner.

* The AOC does not include any contaminated surface or ground water that may be associated with the land-based waste source.

Highlight 4: LDR STATUTORY DEADLINES

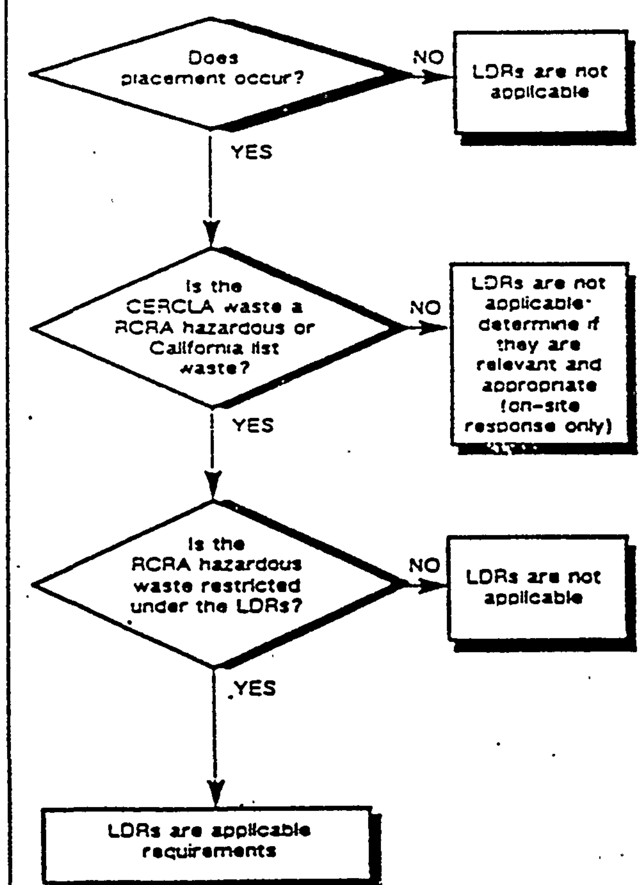
Waste	Statutory Deadline
Spent Solvent and Dioxin-Containing Wastes	November 8, 1986
California List Wastes	July 8, 1987
First Third Wastes	August 8, 1988
Spent Solvent, Dioxin-Containing, and California List Soil and Debris From CERCLA/RCRA Corrective Actions	November 8, 1988
Second Third Wastes	June 8, 1989
Third Third Wastes	May 8, 1990
Newly Identified Wastes	Within 6 months of identification as a hazardous waste

effect at the time placement is to occur. For example, if the RCRA hazardous wastes at a site are currently under a national capacity extension when the CERCLA decision document is signed, site managers should evaluate whether the response action will be completed before the extension expires. If these wastes are disposed of in surface impoundments or landfills prior to the expiration of the extension, the receiving unit would have to meet minimum technology requirements, but the wastes would not have to be treated to meet the LDR treatment standards.

APPLICABILITY DETERMINATIONS

If the site manager determines that the LDRs are applicable to the CERCLA response based on the previous three questions, the site manager must: (1) comply with the LDR restriction in effect, (2) comply with the LDRs by choosing one of the LDR compliance options (e.g., Treatability Variance, No Migration Petition), or (3) invoke an ARAR waiver (available only for on-site actions). If the LDRs are determined <u>not</u> to be applicable, then, for on-site actions only, the site manager should determine if the LDRs are relevant and appropriate. The process for determining whether the LDRs are applicable to a CERCLA action is summarized in Highlight 5.

Highlight 5 - DETERMINING WHEN LDRS ARE APPLICABLE REQUIREMENTS



ATTACHMENT 5

HISTORICAL RAINFALL DATA

TRC

Precipitation Data: CALIFORNIA

INSTR:WG ONLY **ST: CA STA: 7891 DIV: 06SANTA ANA R LAT:34.060 LON:117.060** ELV(FT):1970.000

ITEM	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Mean Total Pcpt	Inches	2.826	2.481	2.621	1.467	0.828	0.126	0.066	0.192	0.494	0.366	1.608	2.214	15.289
Mean Storm Duration	Hours	15.937	15.429	12.895	10.302	9.627	2.882	0.645	1.435	4.422	5.467	10.410	11.724	11.692
Mean Storm Events	Number	3.161	3.000	3.903	2.667	1.710	0.323	0.194	0.452	0.633	0.900	1.833	2.567	21.343
Mean Storm Depth	Inches	0.832	0.690	0.574	0.444	0.298	0.072	0.037	0.114	0.204	0.170	0.561	0.656	0.549
Mean Storm Intensity	In./Hr.	0.048	0.040	0.043	0.044	0.024	0.008	0.017	0.036	0.018	0.023	0.043	0.038	0.039
Mean Max. Storm Intensity	In./Hr.	0.233	0.210	0.241	0.193	0.141	0.037	0.031	0.099	0.072	0.097	0.204	0.201	0.147
Delta	Hours	235.3	226.0	190.6	269.9	435.0	2229.1	3835.0	1646.0	1137.4	826.6	392.7	289.8	410.4

INSTR:WG & FP **ST: CA STA: 7902 DIV: 06SANTA BARBA LAT:34.250 LON:119.410** ELV(FT):10.000

ITEM	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Mean Total Pcpt	Inches	4.433	3.502	2.443	1.421	0.377	0.067	0.036	0.048	0.377	0.342	2.255	2.497	17.798
Mean Storm Duration	Hours	14.132	11.991	8.170	8.218	2.863	0.750	0.588	0.629	1.915	2.375	8.855	10.843	9.620
Mean Storm Events	Number	3.813	3.219	3.452	2.188	0.516	0.156	0.088	0.029	0.471	1.194	2.455	2.710	20.291
Mean Storm Depth	Inches	1.111	0.817	0.626	0.472	0.180	0.055	0.035	0.043	0.175	0.144	0.653	0.775	0.696
Mean Storm Intensity	In./Hr.	0.079	0.062	0.077	0.064	0.021	0.013	0.007	0.002	0.020	0.037	0.068	0.065	0.065
Mean Max. Storm Intensity	In./Hr.	0.429	0.375	0.306	0.244	0.075	0.027	0.017	0.014	0.100	0.100	0.326	0.285	0.192
Delta	Hours	195.1	210.6	215.5	329.0	1441.8	4615.3	8454.5	25655.1	1528.6	623.1	293.2	274.5	431.7

INSTR:WG ONLY **ST: CA STA: 7926 DIV: 06SANTA FE DA LAT:34.070 LON:117.580** ELV(FT):430.000

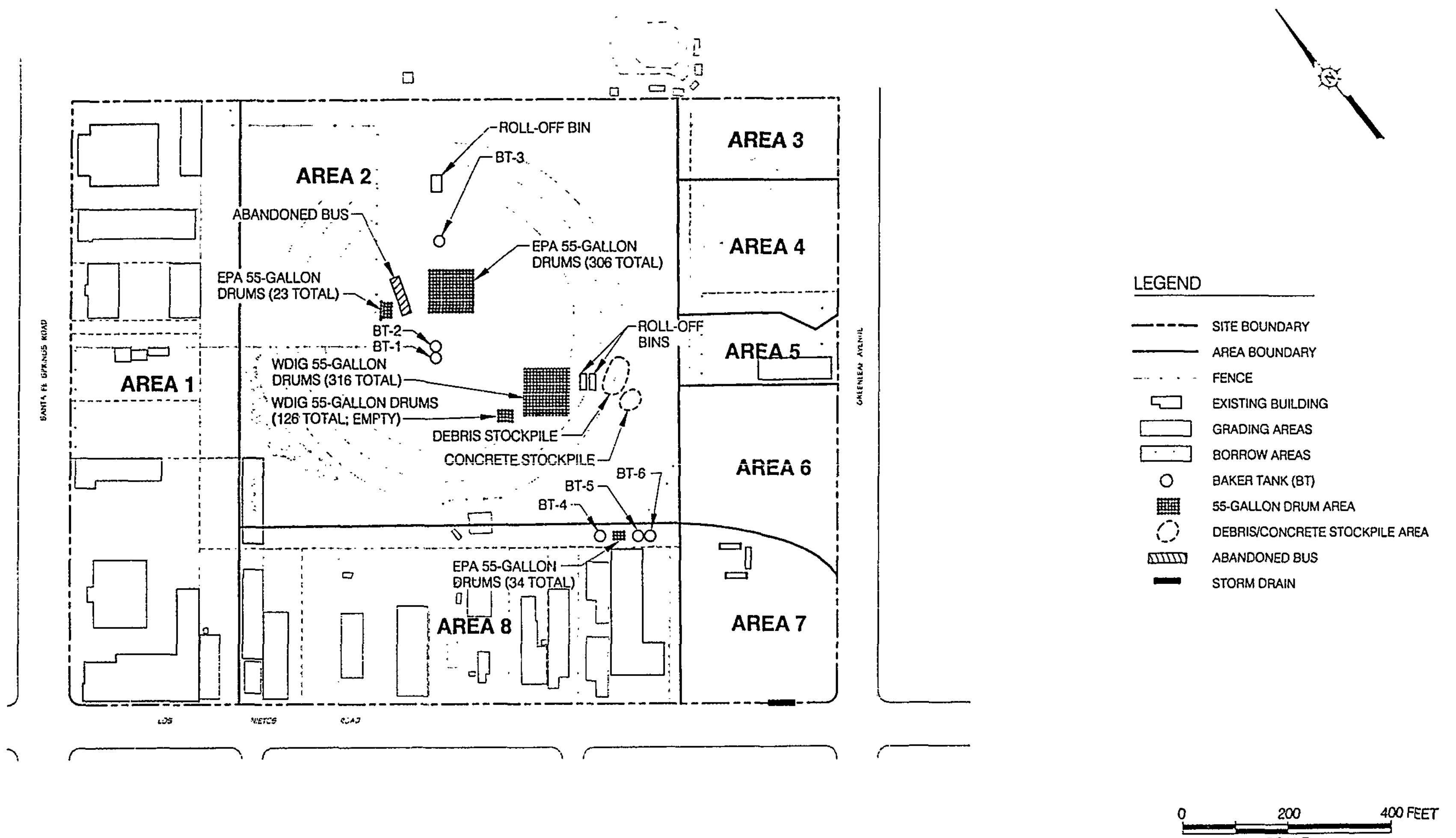
ITEM	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Mean Total Pcpt	Inches	3.838	2.947	2.689	1.389	0.265	0.035	0.008	0.102	0.241	0.268	2.017	2.159	15.958
Mean Storm Duration	Hours	13.712	13.248	10.698	8.815	2.750	0.613	0.129	1.133	2.439	3.032	11.086	12.401	10.777
Mean Storm Events	Number	3.188	2.625	3.469	2.061	0.594	0.097	0.032	0.133	0.400	0.613	1.906	2.063	17.181
Mean Storm Depth	Inches	1.051	0.887	0.689	0.439	0.114	0.016	0.004	0.086	0.087	0.153	0.818	0.684	0.707
Mean Storm Intensity	In./Hr.	0.067	0.056	0.059	0.038	0.015	0.002	0.001	0.007	0.010	0.034	0.064	0.046	0.052
Mean Max. Storm Intensity	In./Hr.	0.339	0.296	0.297	0.191	0.063	0.016	0.005	0.021	0.052	0.089	0.295	0.238	0.159
Delta	Hours	233.3	258.2	214.4	349.3	1252.5	7422.6	23250.0	5593.9	1800.0	1213.7	377.7	360.6	509.8

INSTR:WG ONLY **ST: CA STA: 7946 DIV: 06SANTA MARIA LAT:34.540 LON:120.270** ELV(FT):250.000

ITEM	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Mean Total Pcpt	Inches	2.565	2.609	2.170	1.151	0.237	0.035	0.029	0.046	0.254	0.481	1.391	1.831	12.799
Mean Storm Duration	Hours	12.867	10.681	11.297	9.637	3.393	0.857	0.278	0.806	2.718	5.454	9.651	13.426	10.649
Mean Storm Events	Number	4.000	4.029	4.257	2.200	0.600	0.114	0.056	0.139	0.389	1.000	2.778	3.222	22.784
Mean Storm Depth	Inches	0.573	0.489	0.420	0.373	0.109	0.017	0.021	0.041	0.138	0.292	0.382	0.568	0.447
Mean Storm Intensity	In./Hr.	0.046	0.040	0.038	0.035	0.015	0.002	0.004	0.008	0.014	0.034	0.041	0.044	0.039
Mean Max. Storm Intensity	In./Hr.	0.272	0.235	0.294	0.176	0.053	0.015	0.013	0.021	0.068	0.141	0.210	0.257	0.146
Delta	Hours	186.0	168.2	174.7	327.2	1240.0	6315.7	13285.7	5352.5	1850.9	744.0	259.1	230.9	384.4

INSTR:WG & FP **ST: CA STA: 7976 DIV: 06SANTA YNEZ LAT:34.370 LON:120.050** ELV(FT):600.000

ITEM	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Mean Total Pcpt	Inches	2.655	2.281	2.386	1.188	0.184	0.024	0.041	0.028	0.323	0.390	1.845	2.031	13.576
Mean Storm Duration	Hours	10.049	7.597	9.383	8.849	2.197	0.485	0.176	0.455	1.656	3.485	8.520	11.535	8.677
Mean Storm Events	Number	4.125	3.194	3.765	2.394	0.515	0.091	0.059	0.061	0.500	0.970	2.576	3.061	21.311
Mean Storm Depth	Inches	0.619	0.456	0.511	0.411	0.076	0.015	0.041	0.028	0.148	0.222	0.500	0.683	0.499
Mean Storm Intensity	In./Hr.	0.071	0.060	0.065	0.057	0.016	0.003	0.011	0.004	0.027	0.051	0.060	0.064	0.060
Mean Max. Storm Intensity	In./Hr.	0.294	0.241	0.260	0.186	0.037	0.007	0.014	0.009	0.068	0.133	0.248	0.275	0.148
Delta	Hours	180.3	212.2	197.6	300.7	1444.6	7912.0	12610.1	12196.7	1440.0	767.0	279.5	243.0	411.0



RESERVOIR AREA GRADING AND WASTE/DEBRIS MATERIAL LOCATION

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | FIGURE 1

EPA

Superfund LDR Guide #5

Determining When Land Disposal Restrictions (LDRs) Are Applicable to CERCLA Response Actions

CERCLA Section 121(d)(2) specifies that on-site Superfund remedial actions shall attain "other Federal standards, requirements, criteria, limitations, or more stringent State requirements that are determined to be legally applicable or relevant and appropriate (ARAR) to the specified circumstances at the site." In addition, the National Contingency Plan (NCP) requires that on-site removal actions attain ARARs to the extent practicable. Off-site removal and remedial actions must comply with legally applicable requirements. **This guide outlines the process used to determine whether the Resource Conservation and Recovery Act (RCRA) land disposal restrictions (LDRs) established under the Hazardous and Solid Waste Amendments (HSWA) are "applicable" to a CERCLA response action.** More detailed guidance on Superfund compliance with the LDRs is being prepared by the Office of Solid Waste and Emergency Response (OSWER).

For the LDRs to be applicable to a CERCLA response, the action must constitute placement of a restricted RCRA hazardous waste. Therefore, site managers (OSCs, RPMs) must answer three separate questions to determine if the LDRs are applicable:

(1) Does the response action constitute placement?

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(3) Is the RCRA waste restricted under the LDRs?

Site managers also must determine if the CERCLA substances are California list wastes, which are a distinct category of RCRA hazardous wastes restricted under the LDRs (see Superfund LDR Guide #2).

(1) DOES THE RESPONSE CONSTITUTE PLACEMENT?

The LDRs place specific restrictions (e.g., treatment of waste to concentration levels) on RCRA hazardous wastes prior to their placement in land disposal units. Therefore, a key determination is whether the response action will constitute placement of wastes into a land disposal unit. As defined by RCRA, land disposal units include landfills, surface impoundments, waste piles, injection wells, land treatment facilities, salt dome formations, underground mines or caves, and concrete bunkers or vaults. If a CERCLA response includes disposal of wastes in any of these types of off-site land disposal units, placement will occur. However, uncontrolled hazardous waste sites often have widespread and dispersed contamination, making the concept of a RCRA unit less useful for actions involving on-site disposal of wastes. Therefore, to assist in defining when "placement" does and does not occur for CERCLA actions involving on-site disposal of wastes, EPA uses the concept of "areas of contamination" (AOCs), which may be viewed as equivalent to RCRA units, for the purposes of LDR applicability determinations.

An AOC is delineated by the areal extent (or boundary) of contiguous contamination. Such contamination must be continuous, but may contain varying types and concentrations of hazardous substances. Depending on site characteristics, one or more AOCs may be delineated. Highlight 1 provides some examples of AOCs.

Highlight 1: EXAMPLES OF AREAS OF CONTAMINATION (AOCs)

- A waste source (e.g., waste pit, landfill, waste pile) and the surrounding contaminated soil.
- A waste source, and the sediments in a stream contaminated by the source, where the contamination is continuous from the source to the sediments.*
- Several lagoons separated only by dikes, where the dikes are contaminated and the lagoons share a common liner.

* The AOC does not include any contaminated surface or ground water that may be associated with the land-based waste source.

For on-site disposal, placement occurs when wastes are moved from one AOC (or unit) into another AOC (or unit). Placement does not occur when wastes are left in place, or moved within a single AOC. Highlight 2 provides scenarios of when placement does and does not occur, as defined in the proposed NCP. The Agency is current reevaluating the definition of placement prior to the promulgation of the final NCP, and therefore, these scenarios are subject to change.

> Highlight 2: PLACEMENT
>
> Placement does occur when wastes are:
>
> - Consolidated from different AOCs into a single AOC;
> - Moved outside of an AOC (for treatment or storage, for example) and returned to the same or a different AOC; or
> - Excavated from an AOC, placed in a separate unit, such as an incinerator or tank that is within the AOC, and redeposited into the same AOC.
>
> Placement does not occur when wastes are:
>
> - Treated in situ;
> - Capped in place;
> - Consolidated within the AOC; or
> - Processed within the AOC (but not in a separate unit, such as a tank) to improve its structural stability (e.g., for capping or to support heavy machinery).

In summary, if placement on-site or off-site does not occur, the LDRs are not applicable to the Superfund action.

(2) IS THE CERCLA SUBSTANCE A RCRA HAZARDOUS WASTE?

Because a CERCLA response must constitute placement of a restricted RCRA hazardous waste for the LDRs to be applicable, site managers must evaluate whether the contaminants at the CERCLA site are RCRA hazardous wastes. Highlight 3 briefly describes the two types of RCRA hazardous wastes --listed and characteristic wastes.

> Highlight 3: RCRA HAZARDOUS WASTES
>
> A RCRA solid waste* is hazardous if it is listed or exhibits a hazardous characteristic.
>
> Listed RCRA Hazardous Wastes
>
> Any waste listed in Subpart D of 40 CFR 261, including:
>
> - F waste codes (Part 261.31)
> - K waste codes (Part 261.32)
> - P waste codes (Part 261.33(e))
> - U waste codes (Part 261.33(f))
>
> Characteristic RCRA Hazardous Wastes
>
> Any waste exhibiting one of the following characteristics, as defined in 40 CFR 261:
>
> - Ignitability
> - Corrosivity
> - Reactivity
> - Extraction Procedure (EP) Toxicity
>
> * A solid waste is any material that is discarded or disposed of (i.e., abandoned, recycled in certain ways, or considered inherently waste-like). The waste may be solid, semi-solid, liquid, or a contained gaseous material. Exclusions from the definition (e.g., domestic sewage sludge) appear in 40 CFR 261.4(a). Exemptions (e.g., household wastes) are found in 40 CFR 261.4(b).

Site managers are not required to presume that a CERCLA hazardous substance is a RCRA hazardous waste unless there is affirmative evidence to support such a finding. Site managers, therefore, should use "reasonable efforts" to determine whether a substance is a RCRA listed or characteristic waste. (Current data collection efforts during CERCLA removal and remedial site investigations should be sufficient for this purpose.) For listed hazardous wastes, if manifests or labels are not available, this evaluation likely will require fairly specific information about the waste (e.g., source, prior use, process type) that is "reasonably ascertainable" within the scope of a Superfund investigation. Such information may be obtained from facility business records or from an examination of the processes used at the facility. For characteristic wastes, site managers may rely on the results of the tests described in 40 CFR 261.21 - 261.24 for each characteristic or on knowledge of the properties of the substance. Site managers should work with Regional RCRA staff, Regional Counsel, State RCRA staff, and Superfund enforcement personnel, as appropriate, in making the determinations.

In addition to understanding the two categories of RCRA hazardous wastes, site managers will also need to understand the derived-from rule, the mixture rule, and the contained-in interpretation to correctly identify whether a CERCLA substance is a RCRA hazardous waste. These three principles, as well as an introduction to the RCRA delisting process, are described below.

Derived-from Rule (40 CFR 261.3(c)(2)).

The derived-from rule states that any solid waste derived from the treatment, storage, or disposal of a listed RCRA hazardous waste is itself a listed hazardous waste (regardless of the concentration of hazardous constituents). For example, ash and scrubber water from the incineration of a listed waste are hazardous wastes on the basis of the derived-from rule. Solid wastes derived from a characteristic hazardous waste are hazardous wastes only if they exhibit a characteristic.

Mixture Rule (40 CFR 261.3(a)(2))

Under the mixture rule, when any solid waste and a listed hazardous waste are mixed, the entire mixture is a listed hazardous waste. For example, if a generator mixes a drum of listed F006 electroplating waste with a non-hazardous wastewater (wastewaters are solid wastes - see Highlight 3), the entire mixture of the F006 and wastewater is a listed hazardous waste.

Mixtures of solid wastes and characteristic hazardous wastes are hazardous only if the mixture exhibits a characteristic.

Contained-in Interpretation (OSW Memorandum dated November 13, 1986)

The contained-in interpretation states that any mixture of a non-solid waste and a RCRA listed hazardous waste must be managed as a hazardous waste as long as the material contains (i.e., is above health-based levels) the listed hazardous waste. For example, if soil or ground water (i.e., both non-solid wastes) contain an F001 spent solvent, that soil or ground water must be managed as a RCRA hazardous waste, as long as it "contains" the F001 spent solvent.

Delisting (40 CFR 260.20 and .22)

To be exempted from the RCRA hazardous waste "system," a listed hazardous waste, a mixture of a listed and solid waste, or a derived-from waste must be delisted (according to 40 CFR 260.20 and .22). Characteristic hazardous wastes never need to be delisted, but can be treated to no longer exhibit the characteristic. A contained-in waste does not have to be delisted; it only has to "no longer contain" the hazardous waste.

If site managers determine that the hazardous substance(s) at the site is a RCRA hazardous waste(s), they should also determine whether that RCRA waste is a California list waste. California list wastes are a distinct category of RCRA wastes restricted under the LDRs. (See Superfund LDR Guide #2.)

(3) IS THE RCRA WASTE RESTRICTED UNDER THE LDRs?

If a site manager determines that a CERCLA waste is a RCRA hazardous waste, this waste also must be restricted for the LDRs to be an applicable requirement. A RCRA hazardous waste becomes a restricted waste on its HSWA statutory deadline or sooner if the Agency promulgates a standard before the deadline. Because the LDRs are being phased in over a period of time (see Highlight 4), site managers may need to determine what type of restriction is in

Highlight 4: LDR STATUTORY DEADLINES

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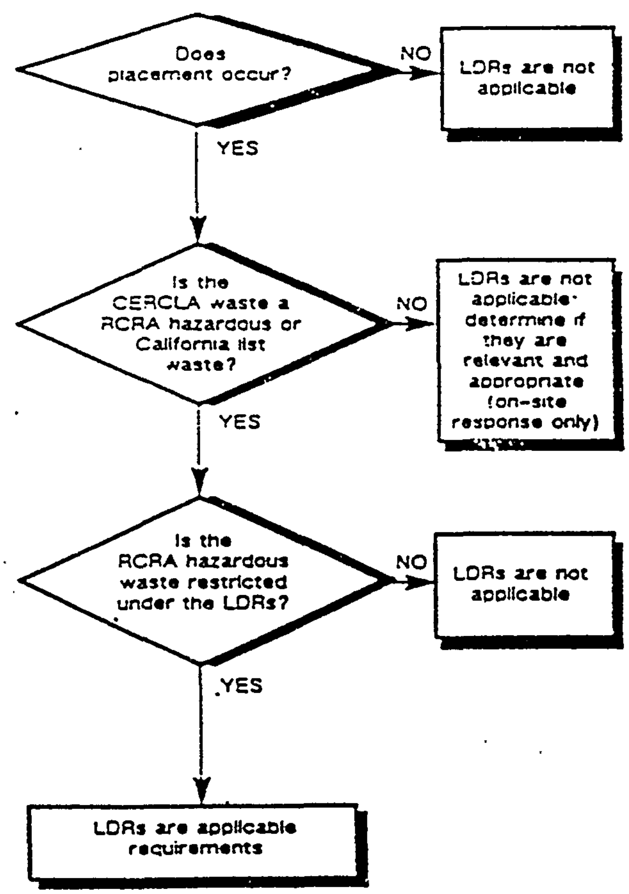
effect at the time placement is to occur. For example, if the RCRA hazardous wastes at a site are currently under a national capacity extension when the CERCLA decision document is signed, site managers should evaluate whether the response action will be completed before the extension expires. If these wastes are disposed of in surface impoundments or landfills prior to the expiration of the extension, the receiving unit would have to meet minimum technology requirements, but the wastes would not have to be treated to meet the LDR treatment standards.

APPLICABILITY DETERMINATIONS

If the site manager determines that the LDRs are applicable to the CERCLA response based on the previous three questions, the site manager must: (1) comply with the LDR restriction in effect, (2) comply with the LDRs by choosing one of the LDR compliance options (e.g., Treatability Variance, No Migration Petition), or (3) invoke an ARAR waiver (available only for on-site actions). If the LDRs are determined not to be applicable, then, for on-site actions only, the site manager should determine if the LDRs are relevant and appropriate. The process for determining whether the LDRs are applicable to a CERCLA action is summarized in Highlight 5.

Highlight 5 - DETERMINING WHEN LDRS ARE APPLICABLE REQUIREMENTS



Precipitation Data: CALIFORNIA

INSTR:WG ONLY ST: CA STA: 7891 DIV: 06SANTA ANA R LAT:34.060 LON:117.060 ELV(FT):1970.000

ITEM	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Mean Total Pcpt	Inches	2.826	2.481	2.621	1.467	0.828	0.126	0.066	0.192	0.494	0.366	1.608	2.214	15.289
Mean Storm Duration	Hours	15.937	15.429	12.895	10.302	9.627	2.882	0.645	1.435	4.422	5.467	10.410	11.724	11.692
Mean Storm Events	Number	3.161	3.000	3.903	2.667	1.710	0.323	0.194	0.452	0.633	0.900	1.833	2.567	21.343
Mean Storm Depth	Inches	0.832	0.690	0.574	0.444	0.298	0.072	0.037	0.114	0.204	0.170	0.561	0.656	0.549
Mean Storm Intensity	In./Hr.	0.048	0.040	0.043	0.044	0.024	0.008	0.017	0.036	0.018	0.023	0.043	0.038	0.039
Mean Max. Storm Intensity	In./Hr.	0.233	0.210	0.241	0.193	0.141	0.037	0.031	0.099	0.072	0.097	0.204	0.201	0.147
Delta	Hours	235.3	226.0	190.6	269.9	435.0	2229.1	3835.0	1646.0	1137.4	826.6	392.7	289.8	410.4

INSTR:WG & FP ST: CA STA: 7902 DIV: 06SANTA BARBA LAT:34.250 LON:119.410 ELV(FT):10.000

ITEM	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Mean Total Pcpt	Inches	4.433	3.502	2.443	1.421	0.377	0.067	0.036	0.048	0.377	0.342	2.255	2.497	17.798
Mean Storm Duration	Hours	14.132	11.991	8.170	8.218	2.863	0.750	0.588	0.629	1.915	2.375	8.855	10.843	9.620
Mean Storm Events	Number	3.813	3.219	3.452	2.188	0.516	0.156	0.088	0.029	0.471	1.194	2.455	2.710	20.291
Mean Storm Depth	Inches	1.111	0.817	0.626	0.472	0.180	0.055	0.035	0.043	0.175	0.144	0.653	0.775	0.696
Mean Storm Intensity	In./Hr.	0.079	0.062	0.077	0.064	0.021	0.013	0.007	0.002	0.020	0.037	0.068	0.065	0.065
Mean Max. Storm Intensity	In./Hr.	0.429	0.375	0.306	0.244	0.075	0.027	0.017	0.014	0.100	0.100	0.326	0.285	0.192
Delta	Hours	195.1	210.6	215.5	329.0	1441.8	4615.3	8454.5	25655.1	1528.6	623.1	293.2	274.5	431.7

INSTR:WG ONLY ST: CA STA: 7926 DIV: 06SANTA FE DA LAT:34.070 LON:117.580 ELV(FT):430.000

ITEM	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Mean Total Pcpt	Inches	3.838	2.947	2.689	1.389	0.265	0.035	0.008	0.102	0.241	0.268	2.017	2.159	15.958
Mean Storm Duration	Hours	13.712	13.248	10.698	8.815	2.750	0.613	0.129	1.133	2.439	3.032	11.086	12.401	10.777
Mean Storm Events	Number	3.188	2.625	3.469	2.061	0.594	0.097	0.032	0.133	0.400	0.613	1.906	2.063	17.181
Mean Storm Depth	Inches	1.051	0.887	0.689	0.439	0.114	0.016	0.004	0.086	0.087	0.153	0.818	0.684	0.707
Mean Storm Intensity	In./Hr.	0.067	0.056	0.059	0.038	0.015	0.002	0.001	0.007	0.010	0.034	0.064	0.046	0.052
Mean Max. Storm Intensity	In./Hr.	0.339	0.296	0.297	0.191	0.063	0.016	0.005	0.021	0.052	0.089	0.295	0.238	0.159
Delta	Hours	233.3	258.2	214.4	349.3	1252.5	7422.6	23250.0	5593.9	1800.0	1213.7	377.7	360.6	509.8

INSTR:WG ONLY ST: CA STA: 7946 DIV: 06SANTA MARIA LAT:34.540 LON:120.270 ELV(FT):250.000

ITEM	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Mean Total Pcpt	Inches	2.565	2.609	2.170	1.151	0.237	0.035	0.029	0.046	0.254	0.461	1.391	1.831	12.799
Mean Storm Duration	Hours	12.867	10.681	11.297	9.637	3.393	0.857	0.278	0.806	2.718	5.454	9.651	13.426	10.649
Mean Storm Events	Number	4.000	4.029	4.257	2.200	0.600	0.114	0.056	0.139	0.389	1.000	2.778	3.222	22.784
Mean Storm Depth	Inches	0.573	0.489	0.420	0.373	0.109	0.017	0.021	0.041	0.138	0.292	0.382	0.568	0.447
Mean Storm Intensity	In./Hr.	0.046	0.040	0.038	0.035	0.015	0.002	0.004	0.008	0.014	0.034	0.041	0.044	0.039
Mean Max. Storm Intensity	In./Hr.	0.272	0.235	0.294	0.176	0.053	0.015	0.013	0.021	0.068	0.141	0.210	0.257	0.146
Delta	Hours	186.0	168.2	174.7	327.2	1240.0	6315.7	13285.7	5352.5	1850.9	744.0	259.1	230.9	384.4

INSTR:WG & FP ST: CA STA: 7976 DIV: 06SANTA YNEZ LAT:34.370 LON:120.050 ELV(FT):600.000

ITEM	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Mean Total Pcpt	Inches	2.855	2.281	2.386	1.188	0.184	0.024	0.041	0.028	0.323	0.390	1.845	2.031	13.576
Mean Storm Duration	Hours	10.049	7.597	9.383	8.849	2.197	0.485	0.176	0.455	1.656	3.485	8.520	11.535	8.677
Mean Storm Events	Number	4.125	3.194	3.765	2.394	0.515	0.091	0.059	0.061	0.500	0.970	2.576	3.061	21.311
Mean Storm Depth	Inches	0.619	0.456	0.511	0.411	0.076	0.015	0.041	0.028	0.148	0.222	0.500	0.683	0.499
Mean Storm Intensity	In./Hr.	0.071	0.060	0.065	0.057	0.016	0.003	0.011	0.004	0.027	0.051	0.060	0.064	0.060
Mean Max. Storm Intensity	In./Hr.	0.294	0.241	0.260	0.186	0.037	0.007	0.014	0.009	0.068	0.133	0.248	0.275	0.148
Delta	Hours	180.3	212.2	197.6	300.7	1444.6	7912.0	12610.1	12196.7	1440.0	767.0	279.5	243.0	411.0

Recyclable and made from recycled paper.

EPA/WDIG
CORRESPONDENCE

TRC Environmental Solutions Inc.

21 Technology Drive
Irvine, California 92718
Telephone 714-727-9336
Facsimile 714-727-7399

MEMO

Date: October 2, 1998

To: Andria Benner, U.S. EPA

From: Alex Isaly, TRC

Re: TM No. 11 Grading Plan Drawings

Project No.: 94-256

Attached is a copy of TM No. 11 Grading Plan Drawings for the Waste Disposal, Inc. (WDI) site. Please include this attachment with the TM No. 11 Reservoir Area Grading and Waste/Debris Management report sent to you on September 4, 1998.

If you have any questions, please give me a call.

AI/CS:ey

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

October 15, 1998

Ian Webster, Sc.D.
WDIG Project Coordinator
c/o Project Navigator, Ltd.
10530 Floral Drive
Whittier, California 90606

Subject: Technical Memorandum No. 11 - Reservoir Area Grading Plans and Waste/Debris Management, Dated September 1998 - Waste Disposal, Inc. (WDI) Superfund Site

Dear Dr. Webster:

The purpose of this letter is to provide approval from the U.S. Environmental Protection Agency (EPA) of Technical Memorandum (TM) No. 11, Reservoir Area Grading Plans and Waste/Debris Management, to conduct an interim measure at the Waste Disposal, Inc. (WDI) Superfund site. The purpose of this interim measure will be to grade the site to improve stormwater drainage and to remove and dispose of investigation-derived waste and other miscellaneous debris. The grading plans specifies a slope of 2% (1% in some places). Please be advised that the State of California regulations require a 3% slope for the final cover of closed landfills, unless otherwise approved. Approval of this interim measure does not necessarily reflect the requirements of the final remedy. The Waste Disposal, Inc. Group (WDIG) is scheduled to commence the work on Monday, October 19, 1998.

If any runoff problems should occur this winter, the WDIG shall take additional measures, as necessary, to correct any such problems.

In conformance with EPA's Off-Site Rule (OSR), Richard Scott, of TRC/Environmental Solutions, Inc., on behalf of the WDIG, left a message last week that the investigative-derived waste liquids will be sent to the Chemical Waste Management, Inc. facility (CAD008302903) in Azusa, California. This facility is currently acceptable to EPA for receipt of liquid wastes from the Waste Disposal, Inc. (WDI) Superfund site.

Shelby Moore, on behalf of the WDIG, confirmed via voice mail to Kathy Steuer on October 12, 1998, that the appropriate notice has been given to the owners of the parcels of the site impacted by the grading and disposal activities. Follow-up confirmation was conducted by EPA today with the attorney for the Pitts Grandchildren's Trust. Additionally, Roberto Puga, of TRC/Environmental Solutions, Inc., confirmed on October 14, 1998, that the WDIG has coordinated with the state and local agencies, which have jurisdictional authority for the management of stormwater discharges.

If you have any questions, please give me a call at (415) 744-2361.

Sincerely,

Andria Benner

Andria Benner
Remedial Project Manager

cc:

Pat Hotra, SCAQMD
Neal Navarro, Army Corps of Engineers
Andy Lazzaretto, City of Santa Fe Springs
Virginia Maloles, LA County DOHS
Clement Walsch, CADHS
Roberta Puga, Project Navigator
John Wondolleck, CDM
Mark Filippini, EPA
Mike Finch, DTSC
Shelby Moore, Esq., WDIG
Tim Crist, CIWMB
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Stan Smucker, Ph.D., EPA
Keith Elliott, RWQCB
Dave Becker, Army Corps of Engineers
Cynthia Wetmore, EPA
William Coakley, EPA ERT
Richard Scott, TRC/ESI
Kathy Steuer, Esq., EPA ORC

TECHNICAL MEMORANDUM NO. 12
WASTE DISPOSAL, INC. SUPERFUND SITE

SUBJECT:	Technical Memorandum No. 12 - Additional Reservoir Liquids Recovery Testing and Piezometer Abandonment	**DATE:** September 18, 1998
SUBMITTED TO:	Mark Filippini, U.S. EPA	**PROJECT NO.:** 94-256
SUBMITTED BY:	Ian Webster, WDIG Project Coordinator	
cc:	Andria Benner, EPA Boone and Associates, WDIG Bill Coakley, EPA ERT Tim Crist, CIWMB Mike Finch, DTSC Ed McGovern, WESTON Roberto Puga, Project Navigator, Ltd.	Richard Scott, TRC Mike Skinner, WDIG Cynthia Wetmore, EPA John Wondolleck, CDM Federal Ken Woodruff, WESTON

1.0 DESCRIPTION OF PROPOSED ACTIVITIES:

1. This Technical Memorandum (TM) No. 12 - Additional Reservoir Liquids Recovery Testing and Piezometer Abandonment, describes the field procedures proposed to evaluate liquids recovery rates from piezometers within the reservoir boundary and the abandonment of these piezometers at the completion of the testing activities. The objectives of the additional work are to further understand the mechanisms and/or phenomena that have been observed with respect to reservoir liquids and to prepare the reservoir area for the grading activities to occur in October 1998.

2. The proposed activities will consist of the following:
   - Purge the liquids from the piezometers located within the reservoir boundary that were installed by EPA in June 1998.
   - Monitor the recovery rates of the liquids and the presence of free product.
   - Abandon the 1-inch PVC piezometers that were installed by EPA in June 1998.

3. The data collected during the recovery test will be used to:
   - Characterize the recharge rates of the reservoir liquids.
   - Determine the presence and recovery rates of free product.
   - Determine if the liquid levels return to static/background levels.

   The information gathered will be factored into the remedial design for the site.

2.0 RATIONALE FOR TM ACTIVITIES:

1. Several liquids observations have recently been made within the reservoir boundary by TM No. 6 and Test Trenching/Pits activities performed by EPA and WDIG. These observations are as follows:
   - Isolated areas of liquids.
   - Varying depths to liquids.
   - Variable presence and thickness of free product.
   - Perched liquids observed on top of waste material.
   - Slow liquid recovery rates.
   - Chemical composition variations throughout the reservoir.
   - Limited and anisotropic radius of extraction well influence.

   The above observations made during these activities support the concept that the materials within the reservoir are extremely heterogeneous.

SUBJECT: TM No. 12 - Additional Reservoir Liquids Recovery Testing and Piezometer Abandonment **DATE:** September 18, 1998

2. The rationale for purging and monitoring the piezometers is based on the following:
   - TM No. 6 and test trenching activities do not support the liquid characteristics and levels reported by EPA in July 1998. This inconsistancy in data is shown in Figure 1.
3. The rationale for the abandonment of the 1-inch PVC piezometers is to prepare the reservoir for the grading activities that are scheduled to occur in October 1998.

3.0 DESCRIPTION AND PROCEDURES FOR PURGING AND MONITORING:

1. Liquids shown in Figure 1 will be monitored using a water/oil interface probe prior to and following purging activities. The liquid levels and the presence of free product will be recorded on a regular basis.
2. Piezometers will be purged using a peristaltic pump and placing tygon tubing to the bottom of the piezometer. The piezometers will be purged of all liquids. If the liquids recover at a rate that prevents the piezometer to go dry, the maximum pump time will be five minutes. Time of pumping and volume of liquids purged will be recorded for each piezometer.
3. The purged liquids will be pumped into a 500-gallon trailer-mounted tank and transported around the site to each monitoring location.
4. Purged liquids will be handled as described in a letter to EPA titled *Purged Liquids Sampling and Disposal Plan*, dated September 17, 1998.
5. Abandonment of the piezometers will be performed by removing the existing 1-inch PVC pipe and pressure grouting the open boring to ground surface.

4.0 SCHEDULE FOR FIELD ACTIVITIES:

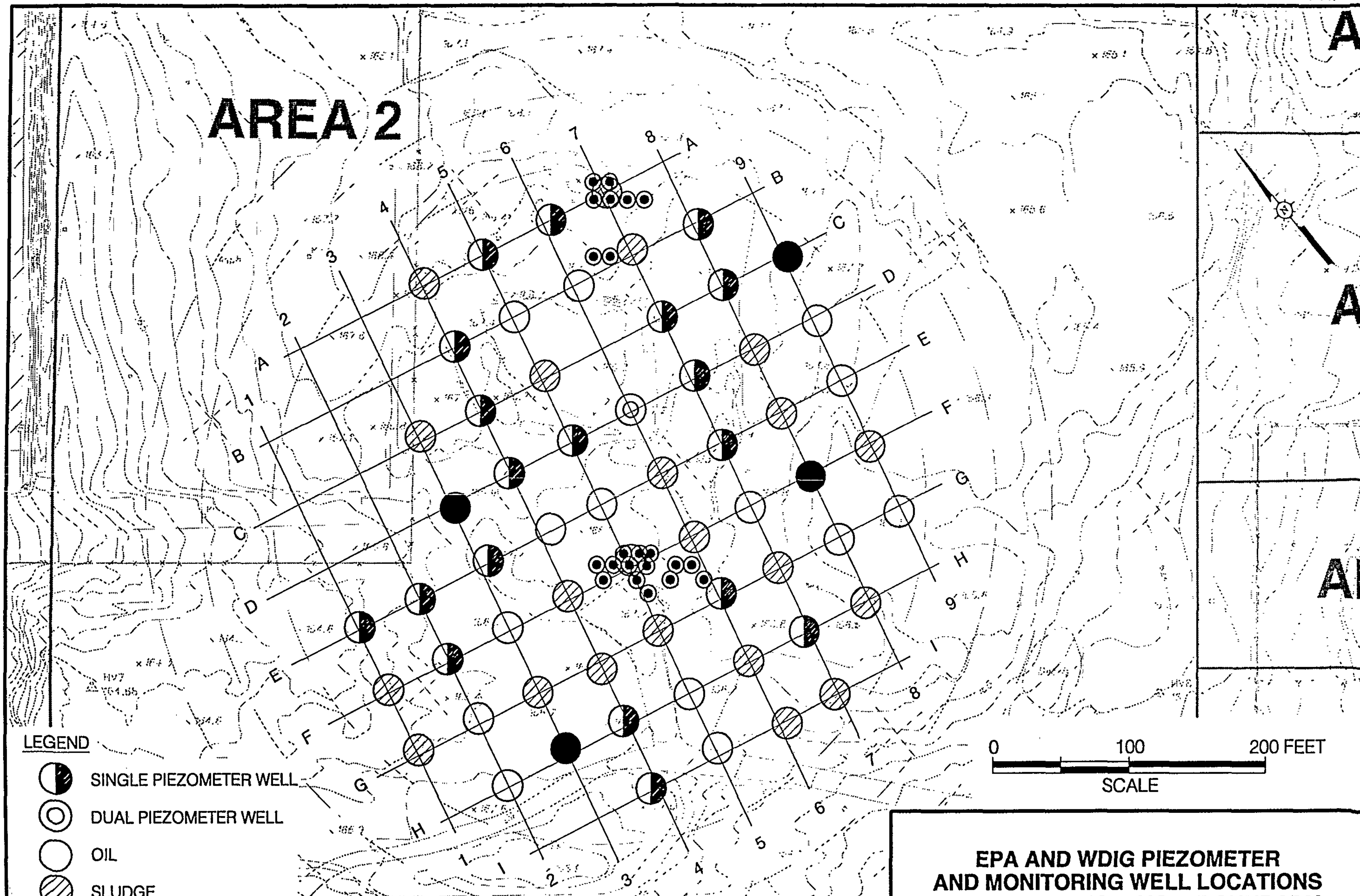
1. TM No. 12 activities are scheduled to commence during the week of September 21, 1998. All activities should be completed prior to the reservoir grading activities (TM No. 11) since these piezometers will be abandoned at that time.
2. A report will be submitted to EPA shortly following the completion of all field activities.

RPM APPROVAL STATUS:

BY: ________________________ **DATE:** ______________

_____ **Approved** _____ **Disapproved** _____ **Additional Information Required**

94-256TM12-01 REV. 9/19/98



LEGEND

- SINGLE PIEZOMETER WELL
- DUAL PIEZOMETER WELL
- OIL
- SLUDGE
- WATER
- TM NO. 6 WELLS

NOTE: TM NO. 6 WELLS ALL CONTAIN LIQUIDS WITH THE EXCEPTION OF EX-3 AND EX-5 (SHALLOW EXTRACTION WELLS, <10 FEET). EX-3 IS LOCATED IN THE NORTHERN PORTION OF THE RESERVOIR. EX-5 IS LOCATED IN THE CENTRAL PORTION OF THE RESERVOIR.

REFERENCE: CDM FEDERAL PROGRAMS CORPORATION, GEOPROBE OBSERVATIONS, DATE JULY 28, 1998

EPA AND WDIG PIEZOMETER AND MONITORING WELL LOCATIONS WITHIN THE RESERVOIR BOUNDARY

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 1

WASTE DISPOSAL INC.
SUPERFUND SITE
Project Coordinator

September 18, 1998 Project No. 94-256

Mr. Mark Filippini
U.S. Environmental Protection Agency
75 Hawthorne Street, No. H-7-2
San Francisco, California 94105-3901

Transmittal
Technical Memorandum No. 12
Waste Disposal, Inc. Superfund Site
Santa Fe Springs, California

Dear Mr. ~~Filippini~~ Mark:

Enclosed please find Technical Memorandum (TM) No. 12-Additional Reservoir Liquids Recovery Testing and Piezometer Abandonment. Field activities will include the purging of all piezometers within the reservoir boundary that were installed by EPA during June 1998 and the abandonment of those piezometers. The purpose of these activities are to help better understand the liquids phenomenon occurring within the reservoir and to prepare the reservoir for grading activities that are scheduled to occur in October 1998.

If you have any questions or comments, please call me at (562) 692-4535.

Sincerely,

Ian

Ian A. Webster
WDIG Project Coordinator

IAW/MG:ey
Enclosures

cc: Andria Benner, EPA
Boone and Associates, WDIG
Bill Coakley, EPA ERT
Tim Crist, CIWMB
Mike Finch, DTSC
Ed McGovern, WESTON
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Ken Woodruff, WESTON

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

September 28, 1998

Ian Webster, Sc.D.
WDIG Project Coordinator
c/o Project Navigator, Ltd.

10530 Floral Drive
Whittier, California 90606

Subject: Technical Memorandum No. 12 - Additional Reservoir Liquids Recovery Testing and Piezometer Abandonment - Waste Disposal, Inc. (WDI) Superfund Site

Dear Dr. Webster:

The purpose of this letter is to provide comments and conditional approval from the U.S. Environmental Protection Agency (EPA) of Technical Memorandum (TM) No. 12, Additional Reservoir Liquids Recovery Testing and Piezometer Abandonment, submitted on September 18, 1998 by the Waste Disposal, Inc. Group (WDIG), subject to the following conditions listed on Attachment 1 being appended to TM No. 12. The EPA approves the WDIG proceeding with this work on October 1, 1998.

If you have any questions, please give me a call at (415) 744-2361.

Sincerely,

Andria Benner

Andria Benner
Remedial Project Manager

Attachment

cc:
Pat Hotra, SCAQMD
Neal Navarro, Army Corps of Engineers
Andy Lazzaretto, City of Santa Fe Springs
Virginia Maloles, LA County DOHS
Clement Walsch, CADHS
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EPA COMMENTS ON TM NO. 12, PIEZOMETER TESTING AND ABANDONMENT, Submitted September 18, 1998 by the Waste Disposal, Inc. Group

Section 3.0, Description and Procedures for Purging, Monitoring, and Abandonment

1. A pumping rate of approximately 1/2 to 1 gpm will be used.

2. Piezometers will be abandoned within 3-5 days once the purging is completed.

4. Piezometers will be monitored for liquids recovery within 1 hour, and again within 24 hours of the initial purging.

5. The minimum pump time will be five minutes, or longer if determined necessary by WDIG and EPA oversight field personnel.

6. The abandonment of the piezometers will completed by pulling each piezometer out several feet, cutting off the top four feet, pushing the piezometer back down, and then plugging the hole with grout.

EPA/WDIG
CORRESPONDENCE

:cycled paper.

WASTE DISPOSAL INC.
SUPERFUND SITE
Project Coordinator

September 18, 1998 Project No. 94-256

Mr. Mark Filippini
U.S. Environmental Protection Agency
75 Hawthorne Street, No. H-7-2
San Francisco, California 94105-3901

Transmittal
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

September 28, 1998

Ian Webster, Sc.D.
WDIG Project Coordinator
c/o Project Navigator, Ltd.

10530 Floral Drive
Whittier, California 90606

Subject: Technical Memorandum No. 12 - Additional Reservoir Liquids Recovery Testing and Piezometer Abandonment - Waste Disposal, Inc. (WDI) Superfund Site

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